

**CONSOLIDATED FINANCIAL STATEMENTS
AT 31 DECEMBER 2023**

Consolidated income statement

(in millions of euros)	Notes	2023	2022
Sales	5.1	139,715	143,476
Fuel and energy purchases	5.2	(80,989)	(121,010)
Other external expenses ⁽¹⁾		(10,493)	(9,420)
Personnel expenses	5.3	(15,470)	(15,236)
Taxes other than income taxes	5.4	(4,064)	(3,163)
Other operating income and expenses	5.5	11,228	367
Operating profit before depreciation and amortisation	5	39,927	(4,986)
Net changes in fair value on energy and commodity derivatives, excluding trading activities	6	363	(849)
Net depreciation and amortisation		(11,161)	(11,079)
(Impairment)/reversals	10.8	(13,011)	(1,762)
Other income and expenses	7	(2,944)	(687)
Operating profit		13,174	(19,363)
Cost of gross financial indebtedness	8.1	(3,830)	(1,730)
Discount effect	8.2	(3,988)	174
Other financial income and expenses	8.3	4,469	(1,997)
Financial result	8	(3,349)	(3,553)
Income before taxes of consolidated companies		9,825	(22,916)
Income taxes	9	(2,470)	3,926
Share in net income of associates and joint ventures	12	257	759
Net income of discontinued operations		-	6
CONSOLIDATED NET INCOME		7,612	(18,225)
EDF net income		10,016	(17,940)
EDF net income - continuing operations		10,016	(17,946)
EDF net income - discontinued operations		-	6
Net income attributable to non-controlling interests		(2,404)	(285)
Net income attributable to non-controlling interests - continuing operations		(2,404)	(285)
Net income attributable to non-controlling interests - discontinued operations		-	-

⁽¹⁾ Other external expenses are reported net of capitalised production costs.

Consolidated statement of comprehensive income

	Notes	2023			2022		
(in millions of euros)		EDF's share	Non-controlling interests	Total	EDF's share	Non-controlling interests	Total
Consolidated net income		10,016	(2,404)	7,612	(17,940)	(285)	(18,225)
Fair value of cash flow hedges							
Fair value of cash flow hedges - gross change	18.7.5	7,089	77	7,166	(3,579)	57	(3,522)
Fair value of cash flow hedges - tax effects		(1,844)	(18)	(1,862)	936	(14)	922
Fair value of net investment hedges							
Fair value of net investment hedges - gross change	18.7.5	(107)	-	(107)	308	-	308
Fair value of net investment hedges - tax effects		23	-	23	65	-	65
Change in fair value of debt instruments							
Gross change in fair value of debt instruments	18.1.2	970	-	970	(1,660)	-	(1,660)
Related tax effect		(247)	-	(247)	428	-	428
Fair value of hedging costs (foreign currency basis spread)							
Fair value of hedging costs (foreign currency basis spread) - gross change ⁽¹⁾	18.7.5	(126)	-	(126)	155	-	155
Fair value of hedging costs (foreign currency basis spread) - tax effects		32	-	32	(40)	-	(40)
Translation adjustments - controlled entities		326	204	530	(1,114)	(546)	(1,660)
Share in net income of associates and joint ventures - items that can be recycled to profit and loss		(244)	(12)	(256)	521	-	521
Gains and losses recorded in equity with recycling		5,872	251	6,123	(3,980)	(503)	(4,483)
Change in fair value of equity instruments							
Gross change in fair value of equity instruments	18.1.2	46	1	47	(16)	-	(16)
Related tax effect		-	-	-	-	-	-
Change in actuarial gains and losses on post-employment benefits							
Gross change in actuarial gains and losses on post-employment benefits ⁽²⁾	16.1.1	564	(151)	413	3,899	(405)	3,494
Related tax effect ⁽²⁾		164	35	199	458	103	561
Share in net income of associates and joint ventures - items that cannot be recycled to profit and loss		(19)	-	(19)	216	-	216
Gains and losses recorded in equity with no recycling		755	(115)	640	4,557	(302)	4,255
Total gains and losses recorded in equity		6,627	136	6,763	577	(805)	(228)
CONSOLIDATED COMPREHENSIVE INCOME		16,643	(2,268)	14,375	(17,363)	(1,090)	(18,453)
Comprehensive income of continuing operations		16,643	(2,268)	14,375	(17,369)	(1,090)	(18,459)
Comprehensive income of discontinued operations		-	-	-	6	-	6

⁽¹⁾The change in the fair value of hedging costs recognised in 2022 includes the €125 million effect of restatements of prior-year figures.

⁽²⁾In 2022, they had a limited tax effect because most of the actuarial gains recognised concern the portion of the provision for employee benefits which will reverse after more than 10 years, and for which no corresponding deferred tax amount has been recognised, in line with the Group's recognition policy for deferred taxes.

Consolidated balance sheet

ASSETS	Notes	31/12/2023	31/12/2022
(in millions of euros)			
Goodwill	10.1	7,895	9,513
Other intangible assets	10.2	11,300	10,619
Property, plant and equipment used in generation and other tangible assets, including right-of-use assets	10.3	100,587	101,126
Property, plant and equipment operated under French public electricity distribution concessions	11.1	66,128	63,966
Property, plant and equipment operated under concessions other than French public electricity distribution concessions	10.5	6,544	6,816
Investments in associates and joint ventures	12	9,037	9,421
Non-current financial assets	18.1	48,327	48,512
Other non-current receivables	13.3.4	2,110	2,165
Deferred tax assets	9.3	7,403	8,696
Non-current assets		259,331	260,834
Inventories	13.2	18,092	17,661
Trade receivables	13.3	26,833	24,844
Current financial assets	18.1	39,442	58,033
Current tax assets		669	497
Other current receivables	13.3.4	9,074	15,165
Cash and cash equivalents	18.2	10,775	10,948
Current assets		104,885	127,148
Assets classified as held for sale	3.2	596	150
TOTAL ASSETS		364,812	388,132
EQUITY AND LIABILITIES			
(in millions of euros)			
Capital	14	2,084	1,944
EDF net income and consolidated reserves		50,084	32,396
Equity (EDF share)		52,168	34,340
Equity (non-controlling interests)	14.5	11,951	12,272
Total equity	14	64,119	46,612
Provisions related to nuclear generation - back-end of the nuclear cycle, plant decommissioning and last cores	15	60,206	56,021
Provisions for employee benefits	16	15,895	16,231
Other provisions	17	4,878	4,671
Non-current provisions		80,979	76,923
Special French public electricity distribution concession liabilities	11.2	50,010	49,459
Non-current financial liabilities	18.3	69,724	71,058
Other non-current liabilities	13.5	5,685	4,968
Deferred tax liabilities	9.3	978	1,533
Non-current liabilities		207,376	203,941
Current provisions	15, 16.1 and 17	7,294	7,943
Trade payables	13.4	19,687	23,284
Current financial liabilities	18.3	38,103	71,844
Current tax liabilities		1,111	967
Other current liabilities	13.5	26,975	33,504
Current liabilities		93,170	137,542
Liabilities classified as held for sale	3.2	147	37
TOTAL EQUITY AND LIABILITIES		364,812	388,132

Consolidated cash flow statement

(in millions of euros)	Notes	2023	2022
Operating activities:			
Consolidated net income		7,612	(18,225)
Net income of discontinued operations		-	6
Net income of continuing operations		7,612	(18,231)
Impairment/(reversals)	10.8.1	13,011	1,762
Accumulated depreciation and amortisation, provisions and changes in fair value		18,116	6,820
Financial income and expenses		1,934	446
Dividends received from associates and joint ventures		702	590
Capital gains/losses		234	(143)
Income taxes	9	2,470	(3,926)
Share in net income of associates and joint ventures	12	(257)	(759)
Change in working capital	13.1	(7,785)	8,301
Net cash flow from operations		36,037	(5,140)
Net financial expenses disbursed		(2,534)	(1,003)
Income taxes paid		(3,695)	(1,282)
Net cash flow from continuing operating activities		29,808	(7,425)
Net cash flow from operating activities relating to discontinued operations		-	-
Net cash flow from operating activities		29,808	(7,425)
Investing activities:			
Acquisitions of equity investments, net of cash acquired		(181)	(198)
Disposals of equity investments, net of cash transferred		227	694
Investments in intangible assets and property, plant and equipment	10.7	(21,021)	(18,324)
Net proceeds from sale of intangible assets and property, plant and equipment		126	87
Changes in financial assets		(2,196)	(7,344)
Net cash flow from continuing investing activities		(23,045)	(25,085)
Net cash flow from investing activities relating to discontinued operations		-	-
Net cash flow from investing activities		(23,045)	(25,085)
Financing activities:			
EDF capital increase	14.1	-	3,252
Transactions with non-controlling interests ⁽¹⁾		1,746	1,795
Dividends paid by parent company	14.2	-	(72)
Dividends paid to non-controlling interests		(482)	(407)
Purchases/sales of treasury shares		-	4
Cash flows with shareholders		1,264	4,572
Issuance of borrowings	18.3.2.1	11,947	34,165
Repayment of borrowings	18.3.2.1	(21,712)	(5,876)
Issuance of perpetual subordinated bonds	14.3 et 14.4	1,377	994
Remunerations paid to bearers of perpetual subordinated bonds	14.3	(630)	(606)
Funding contributions received for assets operated under concessions and investment subsidies		496	694
Other cash flows from financing activities		(8,522)	29,371
Net cash flow from continuing financing activities		(7,258)	33,943
Net cash flow from financing activities relating to discontinued operations		-	-
Net cash flow from financing activities		(7,258)	33,943
Net cash flow from continuing operations		(495)	1,433
Net cash flow from discontinued operations		-	-
Net increase/(decrease) in cash and cash equivalents		(495)	1,433
CASH AND CASH EQUIVALENTS - OPENING BALANCE		10,948	9,919
Net increase/(decrease) in cash and cash equivalents		(495)	1,433
Currency fluctuations		(53)	(397)
Financial income on cash and cash equivalents		293	100
Other non-monetary changes		82	(107)
CASH AND CASH EQUIVALENTS - CLOSING BALANCE	18.2	10,775	10,948

⁽¹⁾ In 2023, these transactions notably include, in the United Kingdom, capital injections of €958 million by CGN into the Hinkley Point C project (€1,351 million in 2022), and a €485 million capital injection by the British government into the Sizewell C project (€209 million in 2022).

⁽²⁾ Including €(2,789) for redemption of perpetual subordinated bonds in 2023 (€(267) million in 2022).

Change in consolidated equity

Details of the change in equity between 1 January and 31 December 2023 are as follows:

(in millions of euros)	Capital	Treasury shares	Translation adjustments	Fair value adjustment of financial instruments (OCI with recycling) ⁽¹⁾	Other consolidated reserves and net income ⁽²⁾	Equity (EDF share)	Equity (non-controlling interests)	Total equity
EQUITY AS PUBLISHED AT 31/12/2021	1,619	(14)	828	(4,474)	52,252	50,211	11,778	61,989
Gains and losses recorded in equity	-	-	(1,003)	(2,977)	4,557	577	(805)	(228)
Net income	-	-	-	-	(17,940)	(17,940)	(285)	(18,225)
Consolidated comprehensive income	-	-	(1,003)	(2,977)	(13,383)	(17,363)	(1,090)	(18,453)
Remuneration on perpetual subordinated bonds	-	-	-	-	(606)	(606)	-	(606)
Issuance/Redemption of perpetual subordinated bonds (see note 14.3)	-	-	-	-	(1,025)	(1,025)	-	(1,025)
Dividends paid	-	-	-	-	(1,050)	(1,050)	(407)	(1,457)
Purchases/sales of treasury shares	-	7	-	-	-	7	-	7
Capital increase by EDF (see note 14.1)	325	-	-	-	3,915	4,240	-	4,240
Other changes ⁽³⁾	-	-	-	-	(74)	(74)	1,991	1,917
EQUITY AT 31/12/2022	1,944	(7)	(175)	(7,451)	40,029	34,340	12,272	46,612
Gains and losses recorded in equity	-	-	156	5,716	755	6,627	136	6,763
Net income	-	-	-	-	10,016	10,016	(2,404)	7,612
Consolidated comprehensive income	-	-	156	5,716	10,771	16,643	(2,268)	14,375
Remuneration on perpetual subordinated bonds	-	-	-	-	(630)	(630)	-	(630)
Issuance/Redemption of perpetual subordinated bonds and OCEANes (see notes 14.3 and 14.4)	140	-	-	-	2,523	2,663	-	2,663
Dividends paid	-	-	-	-	-	-	(482)	(482)
Purchases/sales of treasury shares	-	7	-	-	-	7	-	7
Other changes ⁽³⁾	-	-	-	3	(858)	(855)	2,429	1,574
EQUITY AT 31/12/2023	2,084	-	(19)	(1,732)	51,835	52,168	11,951	64,119

⁽¹⁾ Changes in reserves recorded in OCI (Other Comprehensive Income) with recycling are shown in the Statement of Comprehensive Income. They correspond to the effects of fair value adjustments of debt securities and financial instruments hedging cash flows and net foreign investments, and amounts recycled to profit and loss in respect of unwound hedging contracts and debt instruments sold. They also include changes in the value of hedging costs resulting from the foreign currency basis spread on interest rate swaps and cross-currency swaps.

⁽²⁾ Fair value changes recorded in OCI with no recycling are presented in this column.

⁽³⁾ In 2023, "Other changes" in equity (non-controlling interests) notably include, in the United Kingdom, CGN's capital injections into the Hinkley Point C project totalling €958 million (€1,351 million in 2022), and the British government's €485 million capital injection into the Sizewell C project (€209 million in 2022) (see note 14.5).

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Notes to the consolidated financial statements

Electricité de France (EDF or the “Company”) is a French *société anonyme* governed by French law, and registered in France (22-30, Avenue de Wagram, 75008 Paris).

The consolidated financial statements reflect the accounting position of the Company and its subsidiaries (which together form the “Group”) and the Group’s interests in associates, joint arrangements classified as joint operations, and joint ventures, for the year ended 31 December 2023.

The Group is an integrated energy operator engaged in all aspects of the energy business: power generation (nuclear power, hydropower, wind and solar power, thermal energy, etc.), transmission, distribution, supply, trading, energy services, production of equipment and fuel assemblies, and reactor services.

The Group’s consolidated financial statements at 31 December 2023 were prepared under the responsibility of the Board of Directors and approved by the Directors at the Board meeting held on 15 February 2024.

Note 1 Group accounting policies

1.1 Declaration of conformity and group accounting policies

Pursuant to European regulation 1606/2002 of 19 July 2002 on the adoption of international accounting standards, the EDF group’s consolidated financial statements at 31 December 2023 are prepared under the presentation, recognition and measurement rules set out in the international accounting standards published by the IASB and approved by the European Union for application at 31 December 2023. These international standards are IAS (International Accounting Standards), IFRS (International Financial Reporting Standards), and SIC and IFRIC interpretations.

1.2 Changes in accounting standards

The parent company’s functional currency is the Euro. The Group’s financial statements are presented in millions of euros⁽¹⁾.

The accounting and valuation methods applied by the Group in the consolidated financial statements at 31 December 2023 are identical to those used in the consolidated financial statements at 31 December 2022, with the exception of the changes presented below in notes 1.2.1 to 1.2.5. Information is also given on the standards, amendments and interpretations published by the IASB that are applicable for the Group from 1 January 2024 with no early application in the 2023 consolidated financial statements (note 1.2.6).

The accounting principles and methods used are described in individual notes to the financial statements.

1.2.1 Amendments to IAS 12 “Income taxes” - Deferred tax related to assets and liabilities arising from a single transaction

As of 1 January 2023, entities are required to recognise deferred taxes on transactions that give rise upon initial recognition to equal amounts of taxable and deductible temporary differences.

The amendments to IAS 12 are intended to clarify the treatment of deferred taxes associated with leases and decommissioning obligations. They require recognition of a deferred tax asset and a deferred tax liability for all deductible and taxable temporary differences on such transactions.

As the Group already recognised a net deferred tax amount equal to the difference between deductible and taxable temporary differences on leases and decommissioning obligations, application of these amendments does not have any material impact on its consolidated financial statements. The only change will concern the breakdown of deferred taxes by nature to be provided in the notes to the annual financial statements, starting from the 2023 year-end (note 9.4).

1.2.2 Amendments to IAS 12 “Income taxes” - International Tax Reform — Pillar Two Model Rules

This amendment to IAS 12 published by the IASB in May 2023 contains:

- An exception to IAS 12 requirements, such that deferred taxes related to the Pillar 2 rules are not to be recognised and related disclosures are not required;
- A requirement to disclose in the notes to the financial statements, particularly in the transitional period when Pillar 2 legislation has been adopted but has not yet come into force, all known or reasonably estimable qualitative and quantitative information about the entity’s exposure to the additional taxes resulting from Pillar 2 (note 9).

(1) As the totals in the tables are aggregates of figures that are not rounded up or down, there may be variances between these totals and the sum of their rounded up/down component figures.

1.2.3 IFRS 17 “Insurance contracts”

IFRS 17 defines the recognition, measurement, presentation and disclosure principles for insurance contracts that fall within the standard's scope of application.

The Group has not noted any material impact resulting from application of this standard, largely because the insurance operations of captive companies are internal to the Group since the only beneficiaries are subsidiaries, and are therefore eliminated in consolidation.

1.2.4 Other amendments

The following amendments, applicable since 1 January 2023, have no impact on the Group's financial statements:

- IAS 1 “Presentation of financial statements” – Disclosure of accounting policies;
- IAS 8 “Accounting policies, changes in accounting estimates and errors” – Definition of accounting estimates.

1.2.5 Interest Rate Benchmark Reform - Amendments to IFRS 9, IAS 39, IFRS 7, IFRS 4 and IFRS 16

These amendments have been applicable since 1 January 2021 to financial assets and liabilities for which contractual modifications result directly from the interest rate reform.

This reform is applied prospectively, with no impact on profit and loss, keeping the hedging relationships for the instruments concerned. Its effects are mainly operational (renegotiation of contracts, fallback provisions, information system upgrades).

The replacement operations for the last benchmark rate, USD Libor, were completed in line with its cessation on 30 June 2023.

1.2.6 Standards published by the IASB and applicable for financial years beginning on or after 1 January 2024

1.2.6.1 Amendments to IAS 7 “Statement of cash flows” and IFRS 7 “Financial Instruments: Disclosures - Supplier finance arrangements

In 2023 the IASB published an amendment to IAS 7 and IFRS 7 defining the quantitative and qualitative disclosures required about supplier finance arrangements, to assess how such arrangements affect the entity's liabilities and cash flows, and also its exposure to liquidity risk.

The Group provides the required disclosures in note 13.4, and does not expect application of this amendment to have any material impact on its financial statements.

1.2.6.2 Amendments to IAS 1 “Presentation of financial statements” - Classification of liabilities as current or non-current and Non-current liabilities with covenants

The Group does not anticipate any material impact to result from the first application of the following amendments:

- Classification of liabilities as current or non-current, which clarifies the principles for classifying a balance sheet liability as current or non-current;
- Non-current liabilities with covenants, which states that covenants with which an entity is required to comply after the closing date do not affect the classification of a liability as current or non-current at that date. This amendment aims to improve disclosures on long-term liabilities containing covenants.

1.3 Basis for preparation of the financial statements

1.3.1 Valuation

The consolidated financial statements are prepared on a historical cost basis, with the exception of assets acquired and liabilities assumed through business combinations, and of certain financial instruments, which are stated at fair value.

1.3.2 Translation methods

1.3.2.1 Functional currency

An entity's functional currency is the currency of the economic environment in which it primarily operates. In most cases, the local currency is the functional currency.

1.3.2.2 Translation of the financial statements of foreign companies whose functional currency is not the Euro

The financial statements of foreign companies whose functional currency is not the Euro are translated as follows:

- balance sheets are translated into Euros at the closing rate;
- income statements and cash flows are translated at the average rate for the period;
- resulting differences are recognised in equity under the heading "Translation adjustments".

Translation adjustments affecting a monetary item that is an integral part of the Group's net investment in a consolidated foreign company are included in consolidated equity until the disposal or liquidation of the net investment, at which date they are recognised as income or expenses in the income statement, in the same way as other exchange differences concerning the Company.

1.3.2.3 Translation of transactions in foreign currencies

In application of IAS 21, transactions expressed in foreign currencies are initially translated and recorded in the functional currency of the entity concerned, using the rate in force at the transaction date.

At each reporting date, monetary assets and liabilities expressed in foreign currencies are translated at the closing rate. The resulting foreign exchange differences are taken to the income statement.

However, any payment or receipt of a non-monetary advance in a foreign currency is translated at the exchange rate of the transaction date, with no subsequent adjustment.

1.3.3 Financial statement presentation rules

Assets and liabilities contributing to working capital used in the entity's normal operating cycle are classified as current in the consolidated balance sheet. Other assets and liabilities are classified as current if they mature within one year of the closing date, and non-current if they mature more than one year after the closing date.

The income statement presents items by nature. The heading "Other income and expenses" presented below the operating profit before depreciation and amortisation comprises items of an unusual nature or amount.

1.3.4 Management judgements and estimates

The preparation of the financial statements requires the use of judgments, best estimates and assumptions in determining the value of assets and liabilities, income and expenses recorded for the period, considering positive and negative contingencies existing at year-end. The figures in the Group's future financial statements could differ significantly from current estimates due to changes in these assumptions or economic conditions.

In a context characterised by volatility on the financial and energy markets, the parameters used to prepare estimates are based on macro-economic assumptions appropriate to the very long-term cycle of Group assets.

The principal items for which the Group uses estimates and judgments are the following:

1.3.4.1 Depreciation period of nuclear power plants in France

In the specific case of the depreciation period of its French nuclear power plants, the EDF group's industrial strategy is to continue operation beyond 40 years, in optimum conditions as regards safety and efficiency.

The Group has therefore been making preparations for several years to extend the operation period, and making the necessary investments under its *Grand Carénage* industrial refurbishment programme which was approved in principle by the Board of Directors in January 2015.

The depreciation period of 900MW-series power plants was extended from 40 years to 50 years in 2016 (except for Fessenheim where both reactors were permanently shut down in the first half of 2020) since all the technical, economic and governance conditions were fulfilled.

On 23 February 2021, the Nuclear Safety Authority (*Autorité de Sûreté Nucléaire* - ASN) issued a resolution on the conditions for continued operation of EDF's 900MW reactors beyond their fourth 10-year inspection. The ASN considered that "the measures planned by EDF combined with those prescribed by ASN open the prospect of continued operation of these reactors for a further ten years following their fourth 10-year inspection". This resolution ends the "generic" phase of the review, which concerns the studies and modifications of facilities common to all the 900MW reactors, which all have a similar design model.

The fourth 10-year inspections have been completed at 12 of the 32 reactors in the 900MW series, including Blayais 1 and Saint-Laurent B2 in 2023, and five more are currently in process (Blayais 2, Bugey 3, Chinon B1, Dampierre 3, Gravelines 2).

In 2021, the technical, economic and governance conditions for extending the depreciation period of 1300MW-series plants were fulfilled, and their depreciation period was extended from 40 to 50 years.

The depreciation period of the 1450MW-series units (the four reactors at Chooz and Civaux), which are much more recent, currently remains at 40 years as the conditions for extension are not yet fulfilled.

These depreciation periods take into account the date of recoupling with the network after the most recent 10-year inspection.

1.3.4.2 Nuclear provisions

The measurement of provisions for the back-end of the nuclear cycle, decommissioning and last cores is sensitive to assumptions concerning technical processes, costs, inflation rates, long-term discount rates, the depreciation period of plants currently in operation and disbursement schedules.

These parameters are therefore re-estimated at each closing date to ensure that the amounts accrued correspond to the best estimate of the costs eventually to be borne by the Group.

The Group considers that the assumptions used at 31 December 2023 are appropriate and justified. However, any future change in assumptions could have a significant impact on the Group's financial statements (see note 15).

For France, the main assumptions and sensitivity analyses relating to EDF's nuclear provisions are presented in note 15.1.1.5.

The calculation of provisions incorporates a level of risks and unknowns as appropriate to the operations concerned, together with uncertainty factors such as:

- changes in the regulations, particularly on safety, security and environmental protection, and financing of long-term nuclear expenses;
- changes in the regulatory decommissioning process and the time necessary for issuance of administrative authorisation;
- future methods for storing long-lived radioactive waste and provision of storage facilities by the French agency for radioactive waste management ANDRA (*Agence nationale pour la gestion des déchets radioactifs*);
- changes in the contractual terms for spent fuel management and more generally the outlook for Orano's long-term industrial strategy in line with French energy policy, the operating performance of its installations, and the level of associated costs and investments;
- changes in certain financial parameters such as discount rates and/or inflation rates;
- the useful life of nuclear facilities (calculation of decommissioning provisions for nuclear plants in operation is based on the depreciation period of the assets concerned, *i.e.* 50 years for 900MW-series and 1300MW-series power plants and 40 years for 1450MW-series power plants).

1.3.4.3 Pensions and other long-term and post-employment benefit obligations

The value of pensions and other long-term and post-employment benefit obligations is based on actuarial valuations that are sensitive to all the actuarial assumptions used, particularly concerning discount rates, inflation rates and wage increase rates.

The principal actuarial assumptions used to calculate these post-employment and long-term benefits at 31 December 2023 are presented in note 16. These assumptions are updated annually. The Group considers the actuarial assumptions used at 31 December 2023 appropriate and well-founded, but future changes in these assumptions could have a significant effect on the amount of the obligations and the Group's equity and net income. Sensitivity analyses are therefore presented in note 16.

1.3.4.4 Impairment of goodwill and long-term assets

Impairment tests on goodwill and long-term assets are sensitive to the macro-economic and segment assumptions used – particularly concerning changes in energy prices – as well as medium-term financial forecasts (discount and inflation rates) and completion costs for assets under construction. The Group therefore revises the underlying estimates and assumptions based on regularly updated information.

These assumptions, which are specific to Group companies, are presented in note 10.8.

1.3.4.5 Financial instruments

In measuring the fair value of unlisted financial instruments (principally the debt and equity securities included in dedicated assets, and energy contracts), the Group uses valuation models based on a certain number of assumptions subject to unforeseeable developments.

1.3.4.6 Energy supplied but not yet measured and billed

As explained in note 5.1, the quantities of energy supplied but not yet measured and billed are calculated at the reporting date based on consumption statistic models and selling price estimates. Determination of the unbilled portion of sales revenues at the year-end is sensitive to the assumptions used to prepare these statistics and estimates.

1.3.4.7 Obligations concerning French public distribution concession assets to be replaced

In view of the specific nature of French public electricity distribution concessions, the Group has opted to present its obligations to replace concession assets in the balance sheet at a value based on the amount of contractual commitments as calculated and disclosed to the concession-granting authorities in the annual business reports (see note 11). Measurement of the concession liabilities concerning assets to be replaced is notably subject to unforeseeable developments in terms of costs, the useful life of assets and disbursement dates.

1.3.4.8 Deferred tax assets

The use of estimates and assumptions over recovery horizons is particularly important in the recognition of deferred tax assets.

1.3.4.9 Climate issues

The Group is concerned by the effects of climate change, which are an implicit factor in application of the methods and models used to estimate the values of certain accounting items (see note 20), particularly impairment of non-financial assets.

1.3.4.10 Other judgements and estimates

When there is no standard or interpretation applicable to a specific transaction, the Group exercises judgment to define and apply accounting methods that supply relevant and reliable information for preparation of its financial statements.

For the application of IFRS 10 and IFRS 11, the Group uses judgment to assess control or classify the type of partnership arrangement represented by a jointly-controlled entity. For example EDF has set up “reserved” investment funds (FCPRs) for some of its funds set aside for secure financing of nuclear plant decommissioning expenses and long-term storage expenses for radioactive waste (see note 15.1.2.2). In view of the funds’ characteristics, the prerogatives exercised by their managers and the procedures for defining the management strategies applicable to them, the Group does not consolidate these funds. They are consequently treated as debt securities, in application of IFRS 9.

Through its subsidiary Luminus, the Group has a 49% stake in Luminus Seraing 2.0 SA. The governance and contractual agreements give Luminus exclusive control over this entity, which is fully consolidated in application of IFRS 10.

1.3.5 Restrictions on the Group’s ability to access and use assets or settle liabilities

The main restrictions that may limit the Group’s ability to access or use its assets or settle its liabilities concern the following items:

- assets held to fund employee benefits (principally in France and the United Kingdom – see note 16) and expenses related to nuclear liabilities (principally in France – see note 15.1.2 – and the United Kingdom – see note 15.2);
- tangible and intangible assets and the related liabilities associated with concession agreements, whether or not they are subject to regulatory mechanisms (obligations to supply energy or energy-related services, rules governing investments, an obligation to return concession facilities at the end of the contract, amounts payable at the end of the contract, tariff constraints, etc.). These restrictions mainly apply to assets of this type in France (EDF, Enedis, Electricité de Strasbourg and Dalkia), and to a lesser extent in Italy (see note 10.5);
- the disposal of Group investments in certain subsidiaries may require authorisations from State bodies, particularly when they exercise a regulated activity or operate nuclear power plants (this is the case for EDF Nuclear Generation Ltd. in the United Kingdom and Taishan (TNPJVC) in China);
- prudential reserves established and measures taken as regards distribution capacity, so that the insurance subsidiaries will meet their prudential ratio requirements;
- the cash of certain entities that use financing arrangements stipulating that dividend distribution is subject to conditions concerning repayment of bank debt (or qualification for loans) and shareholders, or are subject to regulatory limitations in certain countries.

Certain shareholder agreements concerning companies controlled by the Group include clauses to protect minority shareholders, requiring approval from minority shareholders for certain particularly important decisions.

Finally, certain financing loans granted to Group entities contain early repayment clauses (see note 18.3.4), and certain items of cash and cash equivalents are subject to restrictions (see note 18.2).

Note 2 Summary of significant events

The main significant events and transactions for the Group in 2023 are the following (references indicate the relevant notes in the 2023 consolidated financial statements):

- **Operation on the Group's capital:**

- The result of the reopened simplified public tender offer for the equity securities of EDF was published (see the Group press release of 23 May 2023, and note 14);
- The squeeze-out procedure for the equity securities of EDF was implemented (see the Group press release of 8 June 2023, and note 14).

- **Nuclear developments:**

- EDF proposed an update to its strategy for controlling stress corrosion (see the Group press releases of 16 March and 26 April 2023, and note 10.6);
- Sizewell C: an equity raise process was launched in November 2023 to raise finance for construction of this nuclear power plant (see note 10.6);
- Hinkley Point C: the project review was finalised, leading to adjustment of the schedule and costs for construction of the two reactors (see the Group press release of 23 January 2024, notes 10.6 and 10.8).

- **Financing operations:**

- The French State requested conversion of EDF's OCEANE bonds by 2024 (see the Group press releases of 28 February 2023 and 24 May 2023, and note 14.4);
- EDF issued approximately €8 billion of senior bonds on various markets, and undertook its first green bond issue dedicated to funding the existing nuclear fleet, totalling €1 billion (see the Group press release of 28 November 2023, and note 18.3.2.2).

- **Environmental, social and governance (ESG) events:**

- The EDF Group announced new objectives to reduce its CO2 emissions and reach "Net Zero Emissions" (see the Group press release of 28 November 2023, and note 20.1.1);
- The Port Est oil-fired power plant (Reunion island) was converted to liquid biomass (see the Group press release of 4 December 2023).

- **Renewable energies:**

- The EDF group and Maple Power were awarded a 1GW offshore wind project wind off the coast of Normandy (see the EDF Renewables and Group press releases of 27 March 2023, and note 12.3).

- **Disposals:**

- EDF completed the sale (announced on 27 September 2022) of its interest in the Sloe CCGT plant (870MW) in the Netherlands (see the Group press release of 25 January 2023, and note 3.1.1);
- Imtech, a Dalkia group company in the United Kingdom, completed an agreement with Duke Street for the sale (announced on 14 November 2022) of its subsidiary Suir Engineering (see the Dalkia press release of 1 February 2023, and note 3.1.2).

The main significant events and transactions for the Group in **2022** were the following (references indicate the relevant notes in the 2022 consolidated financial statements):

- **Operation on the Group's capital:**

- The simplified public tender offer for the equity securities of EDF opened (see the Group press release of 23 November 2022);

- **Nuclear developments:**

- Zero-carbon electricity generation ended and defueling began at Hunterston B (see the EDF Energy press releases of 7 January 2022 and 17 May 2022, and note 15);
- Flamanville EPR updates were released (see the Group press releases of 12 January and 16 December 2022, and note 10.6);
- EDF updated its estimated nuclear output in France for 2022 in accordance with the Group press releases of 13 January, 7 February, 11 February, 15 September and 3 November 2022;
- An update was released on the stress corrosion phenomenon and the 2022 French nuclear output estimate was adjusted (see the Group press release of 19 May 2022, and notes 5 and 10.6);
- Hinkley Point C update: the project schedule and costs were reviewed (see the Group press release of 19 May 2022, and notes 10.6 and 10.8);
- Sizewell C updates were released: A major milestone was reached as the UK Government granted the Development Consent Order to Sizewell C and EDF welcomed the UK government's decision to cofinance development of the Sizewell C project (see the Group press release of 29 November 2022, and note 10.6);
- EDF signed an exclusive agreement to acquire part of GE Steam Power's Nuclear Activities (see the Group press release of 4 November 2022 and note 3.1.3).

- **Disposals:**

- Edison signed an agreement to sell its stake in North Reggane to Repsol and Wintershall Dea (see the Edison press releases of 5 May 2022 and 29 June 2022, and note 3.1.1);
- EDF Trading sold its north American retail business to bp (see the EDF Trading press releases of 12 September and 30 November 2022, and note 3.1.2);

- **Other significant events:**

- Exceptional measures were announced by the French Government (see the Group press release of 13 January 2022, and note 5);
- EDF issued a statement concerning the decision made by the French Competition Authority (see the Group press release of 22 February 2022, and note 17);
- Following publication of the decree and orders relating to the additional allocation of 20TWh of ARENH volumes for 2022, an update of the impact on the 2022 EBITDA outlook was released (see the Group press release of 14 March 2022, and note 5.1.1);
- An appeal was filed concerning the allocation of additional ARENH electricity volumes for 2022 (see the Group press releases of 9 August 2022 and 27 October 2022, and note 5.1.1).

Note 3 Scope of consolidation

ACCOUNTING PRINCIPLES AND METHODS

CONTROLLED ENTITIES

Subsidiaries are companies in which the Group exercises exclusive control and are fully consolidated. The Group controls an entity when the three following conditions are fulfilled:

- it holds power over the entity;
- it is exposed, or has rights, to variable returns from its involvement with the entity;
- it has the ability to use its power to affect the amount of the investor's returns.

The Group considers all facts and circumstances when assessing control. All substantive potential voting rights exercisable, including by another party, are also taken into consideration.

INVESTMENTS IN ASSOCIATES AND JOINT VENTURES

An associate is an entity in which the Group exercises significant influence on financial and operational policies without having exclusive or joint control. Significant influence is presumed to exist when the Group's investment is at least 20%.

A joint venture is a partnership in which the parties (joint venturers) that exercise joint control over the entity have rights to the entity's net assets. Joint control is the contractually agreed sharing of control of an entity operated jointly by a limited number of partners or shareholders, such that the financial and operational policies result from unanimous consent of the parties.

Investments in associates and joint ventures are accounted for by the equity method. They are carried in the balance sheet at historical cost, adjusted for the share in net assets generated after the acquisition, less any impairment. The share in the net income for the period is reported in "Share in net income of associates and joint ventures" in the income statement (see note 12).

INVESTMENTS IN JOINT OPERATIONS

A joint operation is a joint arrangement in which the parties (joint operators) that exercise joint control over the entity have direct rights to its assets, and obligations for its liabilities. The Group, as an operator in a joint operation, reports the assets and liabilities and income and expenses related to its investment line by line.

The Group's principal joint operations are the LNG optimisation activities of JERA Global Markets, co-owned by EDF Trading, and the gas storage operator activity carried out by Friedeburger Speicherbetriebsgesellschaft mbH (FSG).

BUSINESS COMBINATIONS

In application of IFRS 3 business combinations arising since 1 January 2010 are measured and recognised under the following principles:

- at the date of acquisition, the identifiable assets acquired and liabilities assumed, measured at fair value, and any non-controlling interests in the company acquired (minority interests) are recorded separately from goodwill;
- non-controlling interests may be valued either at fair value (full goodwill method) or their share in the fair value of the net assets of the acquired company (partial goodwill method). The decision is made individually for each transaction;
- any acquisition or disposal of an investment in a subsidiary that does not affect control is considered as a transaction between shareholders and must be recorded directly in equity;
- if additional interests are acquired in a joint venture, joint operation or associate without resulting in acquisition of control, the value of the previously-acquired assets and liabilities remains unchanged in the consolidated financial statements;
- if control is acquired in stages, the cost of the business combination includes the fair value, at the date control is acquired, of the purchaser's previously-held interest in the acquired company;
- related costs directly attributable to an acquisition leading to control are treated as expenses for the periods in which they were incurred, except for issuance costs for debt securities or equity instruments, which must be recorded in compliance with IAS 32 and IFRS 9;
- IFRS 3 does not apply to common control business combinations, which are examined on a case-by-case basis to determine the appropriate accounting treatment;
- commitments given by the Group to purchase minority interests in Group-controlled companies are included in liabilities. For commitments of this kind given since 1 January 2010, the date of the Group's first application of IAS 27 (amended) and IFRS 3 (revised), the differential between the value of the non-controlling interests and the liability corresponding to the commitment is recorded in equity.

3.1 Changes in the scope of consolidation

3.1.1 Changes in the scope of consolidation in 2023

The following changes in the Group's scope of consolidation took place during 2023:

- sale of the investment in the Sloe CCGT plant in the Netherlands to EPH, an energy producer and operator of the Czech electricity grid, on 25 January 2023. EDF was a 50% owner and operator of the plant, alongside its partner Pzem. This transaction has an impact of €0.2 billion on the Group's income statement in 2022 (principally due to reversal of a provision for onerous contracts that is no longer relevant) and has a non-significant impact on the Group's net indebtedness in 2023.
- sale of 100% of Suir Engineering by Imtech to the private equity fund Duke Street on 1 February 2023. This transaction has a positive impact of €0.1 billion on the Group's net indebtedness in 2023, and a non-material impact on consolidated net income.

Edison also finalised the sale of its 11.25% stake in the North Reggane gas field licence in Algeria to Repsol and Wintershall Dea on 12 October 2023, following approval of the operation by the Algerian authorities. As the relevant binding agreements were signed in 2022, the corresponding assets and liabilities were classified as assets held for sale and related liabilities at 31 December 2022 (see note 3.2). This operation has no impact on the net income for 2023.

3.1.2 Changes in the scope of consolidation in 2022

The following changes in the Group's scope of consolidation took place during 2022 (see note 3.1.1 to the consolidated financial statements at 31 December 2022) :

- acquisition by Imtech (a Dalkia subsidiary) of SPIE UK on 19 December 2022. This acquisition had no significant impact on the Group's financial statements;
- EDF Trading Limited sold its subsidiary EDF Energy Services LLC (EDFES), which covers the retail businesses of EDF Trading North America, on 30 November 2022. EDF Trading's business in Europe and Asia and its wholesale trading business in North America were unaffected by this transaction, which reduced the Group's net indebtedness by €0.5 billion in 2022.

3.1.3 GE Steam Power's Nuclear Activities

On 4 November 2022, GE and EDF signed a final agreement related to EDF's acquisition of GE Steam Power's nuclear activities. These activities include the manufacturing of conventional island equipment for new nuclear power plants, including the Arabelle steam turbine as well as maintenance and upgrade activities for existing nuclear power plants in all regions other than the Americas. The transaction also includes steam turbine technology for first and second-generation European pressurized reactors (EPR and EPR2) and small modular reactors (SMR).

This acquisition will enable EDF Group to strengthen its conventional island technologies and skills, which are essential for the durability of the existing nuclear fleet and future projects.

Completion of this operation, initially expected during the second half of 2023, will take place once all the necessary conditions, including issuance of the required regulatory authorisations, have been fulfilled.

3.2 Assets held for sale and related liabilities

ACCOUNTING PRINCIPLES AND METHODS

Assets that qualify as held for sale and related liabilities are disclosed separately from other assets and liabilities in the balance sheet.

When assets or groups of assets are classified as discontinued operations, income and expenses relating to these discontinued operations are disclosed in a single net amount after taxes in the income statement and net changes in cash and cash equivalents of discontinued operations are also reported separately in the cash flow statement.

Impairment is booked when the realisable value is lower than the net book value.

In accordance with IFRS 5:

- for assets or groups of assets that are identified and classified as held for sale during the year, there is no change of presentation or retrospective restatement in prior year balance sheets;
- assets or groups of assets that qualify as discontinued operations are restated in the income statement and the cash flow statement for the prior periods presented in the financial statements.

At 31 December 2023, assets held for sale and related liabilities concern the ongoing sales of Edison's gas storage assets in Italy and a gas storage asset belonging to EDF Energy in the United Kingdom, as well as a price supplement on the Cassiopea gas project (E&P in Italy).

In application of IFRS 5, assets held for sale and related liabilities are shown below:

(in millions of euros)	31/12/2023	31/12/2022
ASSETS HELD FOR SALE	596	150
Property, plant and equipment and intangible assets	440	62
Other current assets ⁽¹⁾	156	88
LIABILITIES RELATED TO ASSETS HELD FOR SALE	147	37
Provisions and other non-current liabilities	137	-
Other current liabilities ⁽¹⁾	10	37

⁽¹⁾Other current assets and liabilities comprise components of working capital.

3.3 Scope of consolidation at 31 December 2023

The Group's business sectors are defined as follows:

- **"Generation/Supply" (G):** generation of nuclear energy, thermal energy, and renewable energies (wind, photovoltaic and hydro) and energy sales to industry, local authorities, small businesses and private customers. This segment also includes trading activities;
- **"Distribution" (D):** management of the low and medium-voltage public electricity distribution networks;
- **"Reactors and Services (Framatome)" (R):** services and production of equipment and fuel for nuclear reactors;
- **"Services and other activities" (O):** energy services (district heating, thermal energy services, etc.) for industry and local authorities. This activity also includes EDF Invest's holding companies and entities that are classified as dedicated assets.

The companies and subgroups included in the EDF Group consolidation are listed below.

3.3.1 Fully consolidated companies

		Percentage ownership at 31/12/2023	Percentage ownership at 31/12/2022	Business sector
France – Generation and Supply				
Electricité de France – Parent Company		100.00	100.00	G,D,O
Group Support Services (G2S)		100.00	100.00	O
Edvance		95.10	95.10	O
Nuward ⁽¹⁾		100.00	-	O
Cyclife		100.00	100.00	O
IZI Confort (formerly CHAM SAS)		100.00	100.00	O
Sowee		100.00	100.00	O
IZI Solutions		100.00	100.00	O
IZI Solutions Renov		100.00	100.00	O
IZIVIA		100.00	100.00	O
EDF Pulse Holding		100.00	100.00	O
Hynamics		100.00	100.00	G
Agregio Solutions ⁽²⁾		100.00	100.00	O
Energy2Market (E2M)		100.00	100.00	O
EDF ENR (formerly ENRS)		100.00	100.00	O
Immo C47		51.00	51.00	O
Other holding companies (EDF Invest)		100.00	100.00	O
France – Regulated activities				
Enedis		100.00	100.00	D
Electricité de Strasbourg		88.64	88.64	G, D
EDF Production Electrique Insulaire (EDF PEI)		100.00	100.00	G
Framatome				
Framatome	France	75.50	75.50	R
United Kingdom				
EDF Energy Holdings Limited (EDF Energy)		100.00	100.00	G, O
EDF Energy UK Ltd.		100.00	100.00	O
Italy				
Edison SpA (Edison)		97.17	97.17	G, O
Transalpina di Energia SpA (TdE SpA)		100.00	100.00	O
Other international				
EDF International SAS	France	100.00	100.00	O
EDF Belgium SA	Belgium	100.00	100.00	G
Luminus SA	Belgium	68.63	68.63	G, O
EDF Norte Fluminense SA	Brazil	100.00	100.00	G
EDF (China) Holding Ltd.	China	100.00	100.00	O
EDF Inc.	USA	100.00	100.00	O
Mekong Energy Company Ltd. (MECO)	Vietnam	56.25	56.25	G
Lingbao	Chine	65.00	65.00	G
EDF Andes Spa	Chili	100.00	100.00	G

⁽¹⁾ Nuward was formed in 2023 (see the Group press release of 30 March 2023).

⁽²⁾ Agregio Solutions is a new entity resulting from the merger of two existing subsidiaries, Agregio and EDF Store&Forecast (see the Group press release of 16 May 2023).

		Percentage ownership at 31/12/2023	Percentage ownership at 31/12/2022	Business sector
EDF Renewables				
EDF Renewables	France	100.00	100.00	G,O
Dalkia				
Dalkia	France	99.94	99.94	O
Other activities				
EDF Développement Environnement SA	France	100.00	100.00	O
EDF IMMO and real estate subsidiaries	France	100.00	100.00	O
Société C3	France	100.00	100.00	O
EDF Holding SAS	France	100.00	100.00	O
Citégestion	France	100.00	100.00	O
EDF Trading Ltd.	United Kingdom	100.00	100.00	G
Wagram Insurance Company DAC	Ireland	100.00	100.00	O
EDF Investissements Groupe SA	Belgium	92.46	92.46	O
Océane Re	Luxembourg	99.98	99.98	O
EDF Gas Deutschland GmbH	Germany	100.00	100.00	O

3.3.2 Joint operations

		Percentage ownership at 31/12/2023	Percentage ownership at 31/12/2022	Business sector
Other activities				
Friedeburger Speicherbetriebsgesellschaft GmbH (Crystal)	Germany	50.00	50.00	O

3.3.3 Companies accounted for by the equity method

		Percentage ownership at 31/12/2023	Percentage ownership at 31/12/2022	Business sector
France – Generation and Supply				
Domofinance	France	45.00	45.00	O
CTE (EDF Invest) ⁽¹⁾	France	50.10	50.10	O
Elisandra IV (Madrileña Red de Gas Holding) (EDF Invest)	Spain	20.00	20.00	O
Central Sicaf (EDF Invest)	Italy	24.50	24.50	O
Aéroports Côte d'Azur (EDF Invest)	France	19.40	19.40	O
Ecowest (EDF Invest)	France	50.00	50.00	O
Fallago Rig (EDF Invest)	United Kingdom	20.00	20.00	G
Fenland Wind Farm (EDF Invest)	United Kingdom	20.00	20.00	G
Catalinar Solar (EDF Invest)	USA	50.00	50.00	G
Switch (EDF Invest)	USA	50.00	50.00	G
Red Pine (EDF Invest)	USA	50.00	50.00	G
Energy Assets Group (EDF Invest)	United-Kingdom	40.00	40.00	O
Valentine Solar (EDF Invest)	USA	50.00	50.00	G
Glacier's Edge (EDF Invest)	USA	50.00	50.00	G
Nicolas Riou (EDF Invest)	Canada	50.00	50.00	G
Korian & Partenaires Immobilier 1 & 2 (EDF Invest)	France	24.50	24.50	O
Issy Shift (EDF Invest)	France	33.33	33.33	O
Orange Concessions (EDF Invest)	France	16.67	16.67	O
92 France (EDF Invest)	France	50.00	50.00	O
Memphis (EDF Invest)	France	50.00	-	O
Other international				
Compagnie Énergétique de Sinop (CES)	Brazil	51.00	51.00	G
SLOE Centrale Holding BV	Netherlands	-	50.00	G
Shandong Zhonghua Power Company, Ltd.	China	19.60	19.60	G
Datang Sanmenxia Power Generation Co., Ltd.	China	35.00	35.00	G
San Men XIA	China	35.00	35.00	G
Taishan Nuclear Power Joint Venture Company Ltd. (TNPJVC)	China	30.00	30.00	G
Jiangxi Datang International Fuzhou Power Generation Company Ltd.	China	49.00	49.00	G
Nam Theun 2 Power Company (NTPC) (EDF Invest)	Laos	40.00	40.00	G
Generadora Metropolitana (GM)	Chile	50.00	50.00	G
Nachtigal Hydro Power Company	Cameroon	40.00	40.00	G

⁽¹⁾Coentreprise de Transport d'Electricité or CTE, the company holding 100% of RTE.

3.3.4 Companies in which the EDF group's voting rights differ from its percentage ownership

The percentage of voting rights, which is decisive for assessing control, differs from the Group's percentage ownership for the following entities:

	Percentage ownership at 31/12/2023	Percentage of voting rights held at 31/12/2023
Edison SpA	97.17	100.00
EDF Investissements Groupe SA	92.46	50.00

Note 4 Segment reporting

4.1 Reporting by operating segment

ACCOUNTING PRINCIPLES AND METHODS

Segment reporting presentation complies with IFRS 8, "Operating segments".

Segment reporting is presented before inter-segment eliminations. Inter-segment transactions take place at market prices.

In accordance with IFRS 8, the breakdown used by the EDF group corresponds to the operating segments as regularly reviewed by the Management Committee (the Group's chief operating decision-maker).

The Group's segments are:

- **"France – Generation and Supply"**: EDF SA's energy production and sales activities. This segment also includes entities operating on the downstream sectors (B2B and B2C, aggregation) and all EDF Invest's shareholdings;
- **"France – Regulated activities"**: Enedis and Electricité de Strasbourg's distribution activities, and EDF's island activities;
- **"Framatome"**: the entities of the Framatome subgroup;
- **"United Kingdom"**: the entities of the EDF Energy subgroup;
- **"Italy"**: Edison entities and TdE SpA;
- **"Other international"**: EDF International and the entities located in continental Europe, the US, Latin America and Asia;
- **"EDF Renewables"**: the entities of the EDF Renewables subgroup;
- **"Dalkia"**: the entities of the Dalkia subgroup;
- **"Other activities"**: comprising in particular EDF Trading and EDF Investissements Groupe.

No segments have been merged.

4.1.1 At 31 December 2023

(in millions of euros)	France – Generation and Supply	France – Regulated activities	Framatome	United Kingdom	Italy	Other international	EDF Renewables	Dalkia	Other activities ⁽⁵⁾	Inter-segment eliminations	Total
Income statement:											
External sales	60,313	19,370	2,010	21,094	17,745	5,168	1,338	5,733	6,944	-	139,715
Inter-segment sales	3,931	43	2,056	38	42	415	693	662	733	(8,613)	-
TOTAL SALES	64,244	19,413	4,066	21,132	17,787	5,583	2,031	6,395	7,677	(8,613)	139,715
OPERATING PROFIT BEFORE DEPRECIATION AND AMORTISATION	24,677	3,707	597	3,967	1,855	872	932	407	3,255	(342)	39,927
OPERATING PROFIT	18,651	13	238	(9,823)	789	245	206	35	3,162	(342)	13,174
Balance sheet:											
Goodwill	130	223	1,475	4,901	150	51	197	626	142	-	7,895
Intangible assets and property, plant and equipment	64,499	71,353	2,953	21,593	5,721	2,495	13,060	2,429	456	-	184,559
Investments in associates and joint ventures ⁽¹⁾	3,379	-	68	187	301	1,666	2,509	60	867	-	9,037
Financial assets and cash ⁽²⁾	61,901	369	486	13,553	366	1,174	2,237	201	18,257	-	98,544
Other segment assets ⁽³⁾	34,376	4,436	2,298	5,953	2,986	1,531	939	2,881	8,781	-	64,181
Assets classified as held for sale	-	-	-	53	543	-	-	-	-	-	596
TOTAL ASSETS	164,285	76,381	7,280	46,240	10,067	6,917	18,942	6,197	28,503	-	364,812
Other information:											
Net depreciation and amortisation ⁽⁴⁾	(4,572)	(3,579)	(332)	(854)	(531)	(298)	(643)	(307)	(45)	-	(11,161)
Impairment	(50)	21	(19)	(12,871)	(8)	-	(83)	(1)	-	-	(13,011)
Equity (non-controlling interests)	120	54	218	8,520	541	708	1,073	198	519	-	11,951
Investments in intangible assets and property, plant and equipment	6,584	5,217	341	5,529	520	315	2,124	366	25	-	21,021
Loans and other financial liabilities	96,129	6,152	296	7,984	1,780	18,754	11,603	2,086	2,795	(60,932)	86,647
- external liabilities	79,349	853	268	373	1,031	156	3,970	383	264	-	86,647
- intersegment liabilities ⁽⁶⁾	16,780	5,299	28	7,611	749	18,598	7,633	1,703	2,531	(60,932)	-

⁽¹⁾At 31 December 2023, investments in associates and joint ventures include 50.1% of CTE (the joint venture holding RTE's shares) which is part of the France – Generation and Supply segment.

⁽²⁾Financial assets and cash mainly comprise dedicated assets amounting to €30,410 million in the France – Generation and Supply segment (see note 18.1.2), the NLF receivable (see note 18.1.3) amounting to €13,104 million in the United Kingdom segment and the positive fair value of EDF Trading's derivatives, amounting to €14,052 million (in "Other activities").

⁽³⁾Other segment assets include inventories, trade receivables, other receivables and tax assets.

⁽⁴⁾Including net increases in provisions for renewal of property, plant and equipment operated under concessions.

⁽⁵⁾Sales by the "Other activities" segment include the €3,666 million trading margin realised by EDF Trading.

⁽⁶⁾The amount of intersegment liabilities corresponds to the group's centralised cash management (cash pooling by EDF SA, included in the France – Generation and Supply segment) and financing of controlled subsidiaries, particularly EDF International (Other international segment), EDF Energy (United Kingdom segment) and EDF Trading (in the "Other activities" segment).

4.1.2 At 31 December 2022

(in millions of euros)	France – Generation and Supply	France – Regulated activities	Framatome	United Kingdom	Italy	Other international	EDF Renewables	Dalkia	Other activities ⁽¹⁾	Inter-segment eliminations	Total
Income statement:											
External sales	46,787	17,888	2,099	16,085	29,278	5,369	1,404	5,825	18,741	-	143,476
Inter-segment sales	1,899	194	2,023	13	24	290	754	838	983	(7,018)	-
TOTAL SALES	48,686	18,082	4,122	16,098	29,302	5,659	2,158	6,663	19,724	(7,018)	143,476
OPERATING PROFIT BEFORE DEPRECIATION AND AMORTISATION											
	(23,144)	6,723	589	1,325	1,115	336	909	333	7,089	(261)	(4,986)
OPERATING PROFIT	(28,739)	3,142	271	(1,166)	481	(40)	179	120	6,650	(261)	(19,363)
Balance sheet:											
Goodwill	132	223	1,448	6,541	148	49	187	643	142	-	9,513
Intangible assets and property, plant and equipment	61,310	69,070	2,894	26,676	5,876	2,276	11,595	2,347	483	-	182,527
Investments in associates and joint ventures ⁽¹⁾	3,421	-	84	180	234	1,965	2,519	63	955	-	9,421
Financial assets and cash ⁽²⁾	57,926	450	402	15,202	1,209	879	2,583	293	38,549	-	117,493
Other segment assets ⁽³⁾	32,997	5,402	2,156	6,072	5,501	1,415	1,127	3,311	11,047	-	69,028
Assets classified as held for sale	-	-	-	-	150	-	-	-	-	-	150
TOTAL ASSETS	155,787	75,145	6,984	54,671	13,118	6,584	18,011	6,657	51,176	-	388,132
Other information:											
Net depreciation and amortisation ⁽⁴⁾	(4,552)	(3,560)	(310)	(915)	(480)	(314)	(601)	(294)	(53)	-	(11,079)
Impairment	(4)	(54)	(1)	(1,447)	(68)	(57)	(129)	-	(2)	-	(1,762)
Equity (non-controlling interests)	117	48	63	9,347	479	558	916	225	519	-	12,272
Investments in intangible assets and property, plant and equipment	5,745	4,739	283	4,541	560	306	1,806	319	25	-	18,324
Loans and other financial liabilities	103,476	5,270	326	7,945	1,733	16,442	9,694	2,467	5,251	(56,551)	96,053
- external liabilities	89,547	797	267	309	902	157	3,593	347	134	-	96,053
- intersegment liabilities ⁽⁵⁾	13,929	4,473	59	7,636	831	16,285	6,101	2,120	5,117	(56,551)	-

⁽¹⁾At 31 December 2022, investments in associates and joint ventures include 50.1% of CTE (the joint venture holding RTE's shares) which is part of the France – Generation and Supply segment.

⁽²⁾Financial assets and cash mainly comprise dedicated assets amounting to €27,369 million in the France – Generation and Supply segment (see note 18.1.2), the NLF receivable (see note 18.1.3) amounting to €14,000 million in the United Kingdom segment and the positive fair value of EDF Trading's derivatives, amounting to €29,861 million (in "Other activities").

⁽³⁾Other segment assets include inventories, trade receivables, other receivables and tax assets.

⁽⁴⁾Including net increases in provisions for renewal of property, plant and equipment operated under concessions.

⁽⁵⁾Sales by the "Other activities" segment include the €7,038 million trading margin realised by EDF Trading.

⁽⁶⁾The amount of intersegment liabilities corresponds to the group's centralised cash management (cash pooling by EDF SA, included in the France – Generation and Supply segment) and financing of controlled subsidiaries, particularly EDF International (Other international segment), EDF Energy (United Kingdom segment) and EDF Trading (in the "Other activities" segment).

4.2 Sales to external customers, by product and service group

The Group's sales are broken down by product and service group as follows:

- **“Generation/Supply”**: energy generation and energy sales to industry, local authorities, small businesses and residential consumers. This segment also includes EDF Trading;
- **“Distribution”**: management of the low and medium-voltage public electricity distribution networks;
- **“Other”**: services and production of equipment and fuel for reactors, energy services (district heating, thermal energy services, etc.) for industry and local authorities, and electricity generation through cogeneration and renewable energy sources (e.g. wind turbines, photovoltaic panels, etc.).

(in millions of euros)	Generation – Supply	Distribution	Other ⁽¹⁾	Total
2023 :				
External sales:				
- France ⁽²⁾	60,920	18,046	718	79,684
- International and Other activities	50,761	-	9,270	60,031
SALES	111,681	18,046	9,988	139,715

(in millions of euros)	Generation – Supply	Distribution	Other ⁽¹⁾	Total
2022 :				
External sales:				
- France ⁽²⁾	47,087	17,077	511	64,675
- International and Other activities	69,086	-	9,715	78,801
SALES	116,173	17,077	10,226	143,476

⁽¹⁾“Other” groups of services include Framatome and Dalkia.

⁽²⁾France comprises the two operating segments France – Generation and Supply and France – Regulated activities (see note 4.1).

Note 5 Operating profit before depreciation and amortisation

(in millions of euros)	Notes	2023	2022
Sales	5.1	139,715	143,476
Fuel and energy purchases	5.2	(80,989)	(121,010)
External services		(17,281)	(15,353)
Other purchases (excluding external services, fuel and energy)		(4,550)	(4,284)
Change in inventories and capitalised production		11,041	9,949
(Increase)/decrease in provisions on other external expenses		297	268
Other external expenses⁽¹⁾		(10,493)	(9,420)
Personnel expenses	5.3	(15,470)	(15,236)
Taxes other than income taxes	5.4	(4,064)	(3,163)
Other operating income and expenses	5.5	11,228	367
OPERATING PROFIT BEFORE DEPRECIATION AND AMORTISATION		39,927	(4,986)

⁽¹⁾After elimination of foreign exchange effects and changes in the scope of consolidation, Other external expenses increased by 13.4% compared to 2022.

After elimination of foreign exchange effects and changes in the scope of consolidation, the Group's operating profit before depreciation and amortisation showed an organic increase of +€45,046 million. This growth is principally explained by the contributions of the France - Generation and Supply segment (+€47,821 million) and the United Kingdom segment (+€2,668 million), whereas there was a decrease in the contributions of the France - Regulated activities segment (€(3,016) million) and the Other activities segment (€(3,704) million).

In the France - Generation and Supply segment, the organic increase of +€47,821 million in the operating profit before depreciation and amortisation is mainly explained by the significant recovery in production of nuclear power (+41.5TWh) and the increase of hydropower output (+6.3TWh) and favourable price effects, as in contrast to 2022, there were no exceptional regulatory measures penalising the Group in 2023. The caps and buffers introduced in 2022 to limit tariffs (which reduced sales revenues) have been compensated by the State through the CSPE mechanism (in other operating income and expenses).

The organic growth of +€2,668 million in the United Kingdom segment's operating profit before depreciation and amortisation is essentially due to price effects (realised nuclear prices rose by +£23.3/MWh), despite a 6.3TWh decrease in nuclear power output that was mostly attributable to the closure of the Hinkley Point B plant from August 2022.

In the France - Regulated activities segment, the organic decline of €(3,016) million in operating profit before depreciation and amortisation is mainly due to a negative price effect estimated at €(1.3) billion, caused by purchases to cover network power losses at very high market prices (this surplus cost will be offset by future tariff increases). Also, in 2022 a €1.7 billion payment was received from RTE⁽¹⁾ corresponding to a retrocession of interconnection fees, and there was no equivalent to this in 2023.

5.1 Sales

ACCOUNTING PRINCIPLES AND METHODS

Sales essentially comprise income from energy sales (to final customers and as part of trading activities), delivery services related to use of the transmission and distribution network, and connection services. They also comprise income from other services and deliveries of goods, mainly engineering, operating and maintenance services, services related to energy sales, design, delivery and commissioning services for power plants or their major components.

Income on energy sales is recognised as deliveries are made to customers.

The quantities of energy supplied but not yet measured and billed are calculated using consumption statistics and selling price estimates, and are recognised in sales on that basis.

Some Group entities conduct optimisation operations on the wholesale gas and electricity markets, to balance supply and demand in compliance with the Group's risk management policy. The sales concerned are recorded net of purchases. When an entity has a net long position in euros, it is included in "energy sales". A net short position in euros is included in "fuel and energy purchases".

In accordance with IFRS 15 on the principal/agent distinction, energy delivery services are recognised in sales upon delivery to the customer in the following two cases:

- when these services are not distinct from the energy supply service;
- when they are distinct from the energy supply service and the entity concerned is acting as a principal, notably because it bears the risk of execution of the service or is able to set the tariff for delivery to the final customer.

Income from connections to the French electricity network is recognised in sales at the date when the connection becomes operational.

(1) In application of decision 2022-296 of 17 November 2022 published by the French energy regulator Commission de Régulation de l'Énergie (CRE). The substantial increase in wholesale prices resulted in an increase in interconnection income for RTE, and the CRE decided that this "windfall" should be shared with the users of the electricity transmission users earlier than under normal procedures.

The sales revenue from other services or deliveries of goods is recognised over time in the three following cases, based on a contractual analysis:

- when the customer simultaneously receives and consumes all the benefits generated as the service is performed by the Group (this is notably the case of operations and maintenance services);
- when the good or service to be supplied cannot be reallocated to another customer, and the Group is entitled to payment for the work done so far (this is notably the case of certain design, delivery and commissioning activities for power plants or major components designed specifically for a customer);
- when the service creates or enhances an asset (good or service) for which the customer acquires control as performance of the service progresses.

TRADING ACTIVITIES

Sales revenues include the margin realised, essentially by EDF Trading, on energy market trading operations that fall within the scope of IFRS 9, which are recognised at fair value.

EDF Trading is the Group's trading entity. It operates on the markets on behalf of other Group entities and through trading activity for its own purposes or for non-Group entities, backed by the Group's industrial assets and within its assigned risk mandate.

It operates on organised or OTC markets in derivatives such as futures, forwards, swaps and options.

EDF Trading undertakes purchase and sale operations on the wholesale markets in Europe and North America for:

- electricity and fuel (principally gas);
- CO₂ emission permits, weather derivatives and other environmental instruments;
- capacity guarantees for electricity production.

For LNG, optimisation activities (recognised as a joint operation) and trading activities (recognised as a joint venture) are carried out through JERA Global Markets, which is jointly owned with JERA.

CAPACITY MECHANISM

Capacity mechanisms have been set up in France, the UK and Italy to ensure secure power supplies during peak periods.

French system: French law 2010-1488 of 7 December 2010 on the new organisation of the electricity market introduced an obligation in France to contribute to guaranteeing a secure power supply from January 2017.

Operators of electricity generation plants and load-shedding operators must have their capacities certified by RTE, and commit to a forecast level of availability for a given year of delivery. In return, they are awarded capacity certificates.

Meanwhile, electricity suppliers and purchasers of power to compensate for network losses (obligated actors) must have capacity certificates equivalent to consumption by their customers in peak periods. Suppliers pass on the cost of the capacity mechanism to final customers through their sale prices.

The system is completed by registers for capacity trading between actors. Capacity auctions are held several times a year.

The Group is concerned by both aspects of this system, as an operator of electricity plants (EDF SA, Dalkia, EDF Renewables), as an electricity supplier (EDF SA, Électricité de Strasbourg) and as a purchaser of power to compensate for network losses (Enedis and Électricité de Strasbourg).

On 11 September 2023, RTE submitted a proposed change to the capacity mechanism rules to the CRE for its opinion. In its decision 2023-309 of 28 September 2023, the CRE responded in favour of changing the rules and changing certain parameters for delivery years 2025 and 2026 (the safety coefficient, the contribution by interconnections, and the offshore wind power coefficient). The proposed changes provide frameworks for early termination of purchase obligation contracts, and for the inclusion from 2025 of capacities using fossil fuels.

These new rules were approved by decision of the Ministry for the Ecological Transition on 5 October 2023. They set the opening dates for trading of capacity guarantees for delivery years 2025 and 2026 at 1 October 2023 and 1 January 2024 respectively. The duration of the current mechanism's final delivery year, 2026, has been modified so that the future capacity mechanism can be introduced from November 2026; delivery year 2026 of the current capacity mechanism is thus "shortened" and will run from 1 January to 31 March 2026.

For the delivery years shown below the mean market prices resulting from capacity auctions ahead of the delivery year were as follows:

Delivery year	2022	2023	2024
Price (€/kW)	26.2	45.6	27.1

For the delivery year 2025, three auctions have been held, with the following results: €25.5/kW in October, €25.0/kW in November and €9.37/kW in December.

The operations are recorded as follows:

- Sales of certificates are recognised in income when the auctions or over-the-counter sales take place;

- The cost of the capacity mechanism passed on to final customers through regulated sales tariffs and market-price offers is recognised in sales revenues as and when the electricity is delivered. In addition, the ARENH price is considered to have included a capacity value
- Stocks of certificates are stated either at their certification value (*i.e.* cost of certification by RTE) or at their purchase value on the markets;
- Decreases in the stock of certificates are valued at the weighted average unit cost. The timing of recognition depends on the actor:
 - operators of installations: when the auction sales take place;
 - obligated actors: over the 5-month peak period;
- For operators of installations, if the effective capacity is lower than the certified capacity, a liability (accrued expenses or provision) is recorded equivalent to the best estimate of the expense necessary to extinguish the obligation (rebalancing or settlement mechanism);
- For obligated actors, if there is a shortfall in the stocks of capacity certificates, a provision is recorded equivalent to the best estimate of the expense necessary to extinguish the obligation;
- At the closing date, if the realisable value of the stock of capacity certificates is lower than its net book value, impairment is recognised.

British system:

The British capacity mechanism was introduced in 2014 to ensure security of electricity supply by providing a payment for reliable sources of capacity, alongside their electricity revenues, to ensure they deliver energy when needed. It is based on a system of auctions for operators, organised by the electricity system operator “National Grid ESO” to procure capacity 4 years ahead of delivery, with “top-up” actions one year ahead of delivery. Delivery years run from 1 October to 30 September. Capacity providers which have been successful at the auctions are remunerated in the year of delivery out of a fund consisting of contributions from electricity suppliers but may be liable for penalties for failure to meet their obligations.

The electricity suppliers’ contribution to this mechanism is proportional to their sales to customers in the peak demand period and the cost of capacity is passed on to final customers through their sale price.

EDF Energy is concerned by both aspects of this system, as an operator of electricity plants and a supplier.

For accounting purposes, the remuneration received in its capacity as an operator is recognised in sales revenues in the year of delivery, and the contribution paid to the mechanism in its capacity as an electricity supplier is recognised in energy purchases over the peak period. The cost of the capacity mechanism passed on to final customers is recognised in sales revenues as and when the electricity is delivered.

There are penalties for under-delivery and payments for over-delivery during stress events. Thus, any over payments or penalties are recognised as incurred along with the capacity payments, in a ‘net capacity income’ revenue line.

The government has implemented several changes to the detailed operation of the Capacity Market with the objective of ensuring that it continues to meet its objective in an efficient way. However, the main principles of the mechanism have remained unchanged.

The government is currently exploring options for reform of the Capacity Market to improve delivery assurance and to support alignment with net zero and its commitment to deliver a decarbonised electricity system by 2035, subject to security of supply. It may also consider further changes as part of the Review of Electricity Market Arrangements (REMA). The key measures currently under consideration include: strengthening security of supply through changes to the requirements for demonstrating satisfactory performance and increasing penalties for non-delivery at times of system stress; and aligning the Capacity Market with net zero by introducing much tighter emission limits from October 2034 for new plants.

As with previous changes to the Capacity Market, changes to the rules should apply to any new capacity agreements awarded but would not materially change the rights and obligations of capacity providers in respect of existing capacity agreements.

Italian system: A capacity mechanism was set up in 2019 using rules approved in a decree of 28 June 2019 issued by the Economic Development Ministry.

This mechanism is based on an auction process organised by Terna, the Italian transmission grid operator, for each delivery year. Operators of existing and future production or storage units can participate in the auctions. The operators of the capacities selected are paid through a fixed premium during one year for existing capacities and 15 years for future capacities. The fixed premium is paid during the delivery year.

The selected operator must offer its capacity on the day-ahead market (Mercato del Giorno Prima) and the balancing market (Mercato per il Servizio di Dispacciamento). If the selling price on these markets reaches a level exceeding a strike price defined by the Italian Regulatory Authority for Energy, Networks and Environment (ARERA), the operator must repay the surplus to Terna.

Two auctions were held during 2019 for delivery dates set in 2022 and 2023, and Edison won 3.8GW for 2022 and 4.3GW for 2023 for an annual price of €75,000/MW for new capacities and €33,000/MW for existing capacities. In February 2022 another auction for 2024 was held: the capacity offered by Edison (from existing 2.3GW power plants) was entirely assigned for an annual price of 33k€/MW for existing plants.

The fixed premium is recorded in income during the corresponding delivery year, and reduced if appropriate by any repayments made to Terna, or if the power plant is unavailable.

5.1.1 Regulatory changes in France

Regulated electricity sales tariffs in France – "Blue" tariffs

In accordance with article L. 337-4 of the French Energy Code, regulated electricity sales tariffs are set by the Ministers for Energy and the Economy following proposals by the French Energy Regulatory Commission (*Commission de Régulation de l'Énergie* or CRE).

France's Council of State ruled in decisions of 18 May and 3 October 2018 that the principle of regulated electricity sales tariffs is compatible with European Union law when such tariffs serve the general economic interest objective of guaranteeing consumers an electricity price that is more stable than market prices.

In accordance with European Directive 2019/944 of 5 June 2019 on common rules for the internal market for electricity, the French Energy and Climate law of 8 November 2019 authorises continuation of regulated sales tariffs, but they are reserved for residential or business consumers with a subscribed power level of up to 36kVA, provided they have fewer than 10 employees and their annual sales, income or balance sheet total is below €2 million.

Tariff changes

In accordance with article L. 337-4 of the French Energy Code, the French Energy Regulatory Commission "CRE" (*Commission de Régulation de l'Énergie*) is responsible for sending the Ministers for the Economy and Energy its reasoned proposals for regulated sales tariffs for electricity. If no objections are made within three months, the proposals are deemed to have been approved.

The comparability of sales between periods is affected by the tariff changes, presented in the table below:

Date of the CRE proposal	Increase in "blue" residential customer tariffs (incl. taxes / excl. taxes)	Increase in "blue" non-residential customer tariffs (incl. taxes/excl. taxes)	Date of the tariff decision	Date of application
18/01/2022	4.00% / 24.3%	4.00% / 23.6%	28/01/2022	01/02/2022
07/07/2022	No change	No change	28/07/2022	01/08/2022
19/01/2023	15.00% / 20.00%	15.00% / 19.9%	31/01/2023	01/02/2023
22/06/2023	10% / 10.0%	10% / 10.0%	28/07/2023	01/08/2023
18/01/2024	9.5% / 0.18%	5.7% / -3.55%	29/01/2024	01/02/2024

The French government decided to prolong the tariff cap from 1 February 2023, and limited the increase in regulated electricity sales tariffs to 15% (including taxes) above the tariffs in force since 1 February 2022 for all categories of eligible consumers. The government then decided to scale back the tariff cap from 1 August 2023, raising the regulated electricity sales tariffs at that date by 10% (including taxes) compared to the tariffs in force since 1 February 2023.

Article 181 of the Finance Law for 2023, adopted on 30 December 2022, stipulates that if the reasoned proposals for regulated sales tariffs presented by the CRE lead to tariffs defined under article R.337-18 of the same code that, including the applicable taxes, are more than 15% higher than the tariffs applicable at 31 December 2022, the Ministers for the Economy, Energy and the Budget may object to the proposals and by joint decision set a lower level accounting for 95% of the tariff applied for customers' consumption, in order to serve the objective of price stability.

In such an event, the law defines a mechanism to compensate EDF and the local distribution companies for the loss of income on their regulated-tariff offerings, and to compensate all suppliers for the loss of income on market-price offerings for residential and non-residential customers eligible for regulated sales tariffs, via the compensation for public service charges (CSPE).

In a decision of 19 January 2023, the CRE proposed an increase of 99.36% including taxes (108.91% excluding taxes) in the "blue" tariffs for residential customers and 97.94% including taxes (106.88% excluding taxes) in the "blue" tariffs for non-residential customers from 1 February 2023. This proposed increase was primarily justified by:

- the exceptionally high prices on the wholesale markets for delivery in 2023, which had been at record levels for more than a year;
- the outstanding consequences of the tariff cap applied in 2022, to reflect the ultimate reality of the costs involved in the "cost stacking" calculations, including the effects of the additional 20TWh of ARENH supplies.

In line with the tariff cap, this proposal was rejected by the Ministers for the Economy and Energy, who set the increase in the "blue" tariffs for residential and non-residential customers at 15% including taxes (20% and 19.9% respectively excluding taxes) through tariff orders of 30 January 2023, published in the *Journal officiel* of 31 January 2023 and implemented from 1 February 2023.

In a decision of 22 June 2023, the CRE proposed an increase of 0.88% including taxes (0.84% excluding taxes) in the "blue" tariffs for residential customers, and a decrease of 0.32% including taxes (0.35% excluding taxes) in the "blue" tariffs for non-residential customers from 1 August 2023. This proposal was justified primarily by the change in the TURPE tariffs for access to the public electricity network from 1 August 2023, which was partly offset by a downward revision to the catch-up adjustment for 2022, particularly for non-residential customers.

These developments led the CRE to consider the theoretical tariff to be 74.5% higher (including taxes) than the frozen tariffs in place since 1 February 2023.

In line with the tariff cap, this proposal was rejected by the Ministers for the Economy and Energy, who set the increase in the "blue" tariffs for residential and non-residential customers at 10% including taxes through tariff orders of 28 July 2023, published in the *Journal officiel* of 30 July 2023 and implemented from 1 August 2023.

The Group therefore recognised compensation in the income statement at 31 December 2023, for the €13,992 million loss of income (including €1,458 million under the “electricity buffer” mechanism and €88 million under the tariff cap for gas) in operating subsidies at 31 December 2023) (see note 5.5.1).

A CRE proposal submitted on 19 January 2024 to the Higher Energy Council (*Conseil supérieur de l'énergie*) proposes a change in average regulated sales tariffs for electricity from 1 February 2024, of +0.18% excluding taxes for the “blue” tariffs for residential customers and -3.55% excluding taxes for the “blue” tariffs for non-residential customers (compared to the tariffs in force since 1 August 2023).

This proposed change was primarily justified by the decrease in wholesale market prices following the exceptionally high levels observed during the energy price crisis, leading to the discontinuation of the tariff cap component included in the previous tariff.

Article 92 of France's Finance Law of 29 December 2023 for 2024 allows the government to raise the excise duty on electricity (previously named the domestic tax on the final consumption of electricity or TICFE) by a maximum 10% (including taxes) of the average regulated sales tariffs compared to 1 August 2023. The excise duty applicable from 1 February 2024 was set by a decision of 30 January 2024 at €21/MWh, leading to a 9.5% increase (including taxes) in the “blue” tariffs for residential customers and a 5.7% increase (including taxes) in the “blue” tariffs for non-residential customers.

"TURPE" Network access tariffs

The costs borne by the network operators Enedis and RTE for management of the public electricity distribution and transmission networks are covered, provided they are in line with the costs of an efficient network operator, by the "TURPE" tariffs for using the networks, as stipulated in Articles L. 341 - 2 and following of the French Energy Code.

These tariffs apply to users connected to the distribution and transmission networks.

TURPE 6 Distribution and Transmission tariffs

The CRE issued two decisions of 21 January 2021 (published in France's *Journal Officiel* 0096 of 23 April 2021) on the TURPE 6 Transmission (high voltage) and TURPE 6 Distribution (medium voltage – low voltage), after the Higher Energy Council (*Conseil supérieur de l'énergie*) gave its approval. These tariffs apply from 1 August 2021 for a period of approximately 4 years.

For distribution expenses, in its tariff decision n°2021 - 13 of 21 January 2021, the CRE set the margin on assets at 2.5% and the additional return on regulated equity at 2.3%. The average tariff increase was +0.91% at 1 August 2021. In decision n°2022-158 of 9 June 2022, the CRE set the increase in the average TURPE Distribution tariff from 1 August 2022 at +2.26%. In its decision n°2023-137 of 31 May 2023, the rise in the average TURPE Distribution tariff from 1 August 2023 was set at +6.51%.

For transmission expenses, in its tariff decision n°2021 - 12 of 21 January 2021, the CRE set a nominal pre-tax weighted average cost of capital (WACC) of 4.6% for the return on RTE's regulated asset base. The average tariff increase was +1.09% at 1 August 2021. In decision n°2022-157 of 9 June 2022, the CRE set the change in the average TURPE Transmission tariff from 1 August 2022 at -0.01%. In its decision n°2023-136 of 31 May 2023, the rise in the average TURPE Transmission tariff from 1 August 2023 was set at +6.69%.

In its decision 2023 - 01 of 5 January 2023, the CRE adapted the price regulation framework, particularly to make the TURPE 6 (high voltage) and TURPE 6 (medium voltage – low voltage) tariffs incorporate the impact of wholesale electricity prices on the business of RTE and Enedis, by refocusing certain incentives on purchase of electricity volumes to compensate for network losses, rather than on prices.

In another decision, n°2022 - 323 of 8 December 2022, the CRE decided to put in place an exceptional advance payment, to users of the public electricity transmission network, of part of the balance of RTE's income and expense adjustment account (CRCP). In a context of significant growth and volatility in wholesale electricity prices at European level, this surplus for 2022 essentially resulted from particularly high interconnection income. The exceptional payment had a direct effect for users connected to France's public transmission network operated by RTE, including Enedis, who received a one-off payment from RTE in February 2023. The Group therefore recognised a sales credit receivable from RTE at 31 December 2022, amounting to €1,723 million (see note 13.3.4).

Electricity Equalisation Fund

The TURPE tariff for the medium and low-voltage network is identical for every electricity network operator. It is determined on the basis of forecast expenses to be borne by Enedis, provided they correspond to an efficient network operator, and forecasts of the number of consumers connected to Enedis' networks, their consumption, and the power level subscribed.

As this tariff cannot always cover the specific needs of certain service zones, the Electricity Equalisation Fund (FPE) exists to compensate for disparities in network operating conditions. The Energy Code requires electricity distribution costs resulting from public network operation to be shared between public distribution network operators. There are two equalisation mechanisms: one based on fixed amounts, the other set by the CRE based on analysis of the network operators' accounts. The calculation method for the fixed-rate allocation mechanism is defined by decree and ministerial order. The EDF entities concerned by the Electricity Equalisation Fund are Enedis, Electricité de Strasbourg and SEI.

In its decision n°2023-201 of 19 July 2023, the CRE set the final amount of the allocation from the Electricity Equalisation Fund (Fonds de Péréquation de l'Electricité) to SEI at €229.4 million for 2023, following analysis of the network operators' accounts.

For the fixed-amount mechanism, the ministerial order of 22 November 2023 set the 2023 contributions payable and allocations receivable from the Electricity Equalisation Fund for distribution network operators. The fixed contributions due by Strasbourg Electricité Réseaux and Enedis amount to around €1.1 million and €30.1 million respectively. Enedis is also the CRE's designated operator for collection and payment of Electricity Equalisation Fund contributions from all the Local Distribution Companies.

ARENH

General description of the scheme

The ARENH (*Accès Régulé à l'Energie Nucléaire Historique*) scheme for regulated access to historic nuclear power, set up in 2011 and due to end on 31 December 2025, allows alternative suppliers to purchase electricity from EDF to supply their final customers, after signing a framework agreement, at a regulated price for set quantities determined under the provisions of the French Energy Code. This scheme is also open to network operators to cover their energy losses.

The ARENH price, determined by the Ministers for Energy and the Economy following a proposal by the CRE, has been fixed at €42/MWh since January 2012. This includes delivery of the electricity and has incorporated the associated capacity guarantees since 2017.

The maximum total ARENH volume that can be sold by law to suppliers who apply to the scheme to cover the needs of their final customers is set by ministerial order and cannot exceed a legal ceiling. Until 31 December 2019, the ceiling was 100TWh per year. It was then raised to 150TWh by the energy and climate law of 8 November 2019.

The "MUPPA" law of 16 August 2022 introducing urgent measures to protect purchasing power reduced this legal ceiling to 120TWh. The MUPPA law also set a minimum ARENH price of €49.50/MWh, although its application is conditional on prior approval by the European Commission, which has not yet been given.

Additional ARENH scheme measures for 2022

Under exceptional measures imposed on EDF by the Government in early 2022, eligible alternative electricity suppliers could benefit from additional volumes at the price of €46.20/MWh during the period 1 April to 31 December 2022, provided they first sold EDF an equivalent volume to the volume they would buy under the ARENH scheme, at the price of €256.98/MWh. The alternative suppliers only made applications for 19.5TWh of the additional ARENH volume offered.

Applying the procedure set out in its decision n°2022-98 of 31 March 2022, the CRE set up a mechanism to monitor and control the way eligible suppliers passed on the effect of their reduced sourcing costs (resulting from allocation of additional ARENH volumes at the price of €46.20/MWh) through their customer invoicing. EDF was obliged to replicate the terms imposed on alternative suppliers in its own market-price contracts.

This caused very significant prejudice for the company, and on 9 August 2022 EDF filed an appeal against the exceptional measures before the Council of State, on the grounds that the State had exceeded its power.

EDF also lodged a claim before the Paris Administrative Court on 27 October 2022 to obtain full compensation from the French government for the prejudice caused by these measures.

On 3 February 2023, the Council of State rejected EDF's appeal against these measures, in a decision that cannot be challenged. The proceedings brought by EDF in 2023 before the Paris Administrative Court claiming full reparation from the State for the prejudices borne by EDF as a result of the exceptional measures are ongoing. The prejudice suffered was estimated by EDF at €7.96 billion at 13 October 2023, the date when the company filed its reply submissions, plus interest estimated at €0.20 billion at 31 December 2023.

The ARENH scheme in 2023

During 2023, the CRE notified EDF of three suspensions to ARENH deliveries. In two cases this was due to decisions by the CRE's Dispute Resolution and Enforcement Committee (CoDIS), and in the third case it followed a failure to pay price supplements due on deliveries made during 2022. Over the entire year these suspensions concerned a total 5.2MW of electricity.

The ARENH scheme in 2024

For the ARENH allocations for 2024 determined by the CRE's decision n°2023-330 of 26 October 2023, as required by the Energy Code (article R.336-14 of the Energy Code modified by decree n°2022-1380 of 29 October 2022), the CRE has defined the method for allocating ARENH volumes if applications exceed the maximum total volume allowed for 2024. It has also laid down criteria for assessing ARENH applications (verification methods, and where relevant correction procedures for ARENH applications from alternative suppliers).

Under these criteria, any application by EDF-controlled subsidiaries (this does not apply to network operators) taking the total volume above the limit would be fully curtailed, but they could enter into contracts directly with their parent company for supplies on terms identical to the ARENH framework agreement, including the curtailment conditions applied to other alternative suppliers.

On 15 November 2023, the CRE decided on a change to the calculation rules for the ARENH price supplement (CP2) paid by alternative suppliers whose ARENH applications are excessive in view of their actual sales volumes. These changes are likely to make the penalty for such disproportionate applications more dissuasive.

Finally, ARENH applications during the November 2023 session for delivery in 2024 totalled 130.45TWh (excluding applications from EDF subsidiaries and network operators). The CRE scaled down certain applications (-0.04TWh in total), bringing the application volume validated by the CRE to 130.41TWh, and curtailed each supplier's application, to respect the overall ARENH ceiling of 100TWh. The final attribution rate was thus 76.68%. Further volumes were also sold by EDF to its subsidiaries through contracts that replicate the ARENH scheme, and to compensate for network electricity losses (25.54TWh).

Post-ARENH regulation

On 22 November 2023, the French government began a consultation to determine proposed measures to give electricity consumers in France protection, stability and billing predictability after the ARENH scheme ends on 31 December 2025.

Following this public consultation, a proposed law on energy sovereignty was presented by the government on 9 January 2024. The potential implications of this law were taken into account in defining the assumptions used by the Group for impairment testing (see note 10.8).

5.1.2 Sales

Sales are comprised of:

(in millions of euros)	2023	2022
Sales of energy and energy-related services	129,892	129,831
– energy ⁽¹⁾	108,153	109,281
– energy-related services (including delivery ⁽²⁾)	21,739	20,550
Other sales of goods and services	6,157	6,607
Trading	3,666	7,038
SALES	139,715	143,476

⁽¹⁾Sales of energy include €5,330 million of sales related to optimisation operations on the wholesale gas and electricity markets in 2023 (€12,229 million in 2022). These operations are carried out by certain Group entities to balance supply and demand, in compliance with the group's risk management policy. In 2023 as 2022, the principal operating segments with a net short position in euros on the markets are France – Generation and supply (gas), Italy (electricity) and Dalkia (electricity).

⁽²⁾Delivery services included in this item concern the distribution network operators Enedis, Electricité de Strasbourg and EDF SA for non-interconnected zones. However, delivery services concerning EDF Energy and Edison are included in Sales of energy, because those entities are classified as the principal under IFRS 15 for both supply and delivery. The delivery services by EDF Energy and Edison have no impact on net income because they are included in "Transmission and delivery expenses" in note 5.2.

After elimination of foreign exchange effects and changes in the scope of consolidation, the Group's sales for 2023 were down -2.1% or €(3.1) billion. This principally reflects decreases in the Italy segment (€(11.6) billion or -39.6%) and the Other activities segment (€(11.5) billion or -61.5%) which were partly offset the increases in the France – Generation and Supply segment (+€13.5 billion or +28.9%) and the United Kingdom segment (+€5.3 billion or +33.1%).

Sales by the **France – Generation and supply** segment showed organic growth of +€13.5 billion. This increase is mainly explained by favourable price effects on regulated-tariff and market-price sales, despite tariffs being limited by government measures (the tariff cap and electricity buffer). It is also attributable to favourable energy market price effects of +€0.9 billion on purchase obligations (the effect on operating income before depreciation and amortisation was neutral due to the CSPE compensation mechanism covering expenses related to purchase obligations booked in "Other operating income and expenses").

Sales in the **United Kingdom** segment registered an organic increase of €+5.3 billion, principally attributable to the impact of rising energy prices on customer sales tariffs, despite the lower nuclear power output in 2023.

The organic downturn in sales by the **Italy** segment reached €(11.6) billion in 2023. This decrease is essentially explained by lower volumes and prices for gas sales (€(10.3) billion).

The €(11.5) billion organic contraction in sales by the **Other activities** segment is essentially attributable to the gas activities (€(8.4) billion) due to the decrease in wholesale gas prices and in the trading margin (€(3.2) billion). This reflects lower volatility on the markets as prices followed a downward trend, counterbalanced by a lower systemic credit risk.

5.2 Fuel and energy purchases

Fuel and energy purchases comprise:

(in millions of euros)	2023	2022
Fuel purchases used – power generation ⁽¹⁾	(21,497)	(34,509)
Energy purchases ⁽¹⁾	(51,600)	(81,943)
Transmission and delivery expenses	(8,509)	(6,142)
Gain/loss on hedge accounting	(257)	(6)
(Increase)/decrease in provisions related to nuclear fuels and energy purchases	874	1,590
FUEL AND ENERGY PURCHASES	(80,989)	(121,010)

⁽¹⁾Fuel purchases used and Energy purchases include respectively €1,867 million and €26,792 million for optimisation operations on the wholesale gas and electricity markets in 2023 (€2,927 million and €41,458 million in 2022). In 2023 as in 2022, the principal operating segments with net long positions in euros on the markets are France – Generation and supply (electricity), the United Kingdom (gas and electricity), Other international (Luminus – gas and electricity) and Dalkia (gas).

Fuel purchases used include costs relating to raw materials for energy generation (principally nuclear fuels and fissile materials, gas, and a non-significant proportion of coal and oil), purchases of services related to the nuclear fuel cycle, and costs associated with environmental schemes (mainly greenhouse gas emission certificates and renewable energy certificates).

"Energy purchases" include purchases made under the purchase obligation mechanism in France.

After elimination of foreign exchange effects and changes in the scope of consolidation, the Group's fuel and energy purchases were €40 billion lower than in 2022, principally in the France-Generation and Supply segment (€24.2 billion, essentially for electricity purchases), Italy (€12.5 billion for gas purchases), and Other activities (€7.7 billion, principally in the gas business). In France, this decrease is mainly explained by the significantly lower volumes of energy purchased as nuclear and hydropower output improved, and the end of purchases to provide alternative suppliers with additional ARENH volumes.

5.3 Personnel expenses

Personnel expenses comprise:

(in millions of euros)	2023	2022
Wages and salaries	(10,428)	(10,254)
Social contributions	(2,247)	(2,208)
Employee profit sharing	(386)	(333)
Other contributions related to personnel	(365)	(352)
Other expenses linked to short-term benefits	(222)	(226)
Short-term benefits	(13,648)	(13,373)
Expenses under defined-contribution plans	(1,258)	(1,096)
Expenses under defined-benefit plans	(423)	(855)
Post-employment benefits	(1,681)	(1,951)
Other long-term benefits	(120)	121
Termination payments	(21)	(33)
Other personnel expenses	(141)	88
PERSONNEL EXPENSES	(15,470)	(15,236)

Excluding foreign exchange effects and changes in the scope of consolidation, personnel expenses increased by +2% compared to 2022. The increase in wages and salaries reflects the effect of pay rises introduced in the various Group entities during 2023, to take account of inflation.

The impacts of the French pension reform and decisions made by EDF Energy to limit inflation-related increases in pensions (inflation rate of 10%) are presented in Other income and expenses (see note 7).

Average workforce comprise:

(in full time equivalent)	2023	2022
IEG status	96,093	94,232
Other	75,769	70,796
AVERAGE WORKFORCE	171,862	165,028

5.4 Taxes other than income taxes

(in millions of euros)	2023	2022
Payroll taxes	(347)	(310)
Energy taxes	(1,556)	(1,623)
Other non-income taxes	(2,161)	(1,230)
TAXES OTHER THAN INCOME TAXES	(4,064)	(3,163)

After elimination of changes in foreign exchange rates and the scope of consolidation, taxes other than income taxes showed an organic increase of €(903) million or 28.5%, reflecting the introduction of the additional revenue tax mechanisms (the Inframarginal revenue cap on electricity production in the European Union and the Electricity Generator Levy in the United Kingdom), which had an effect of €(567) million in 2023 (compared to €102 million in 2022), principally in the United Kingdom (€(400) million) and Other international segments (€(146) million). In the France-Generation and Supply segment, the tax due under the inframarginal revenue cap mechanism is very limited due a significant tax loss carryforward from 2022, generated by purchases on the markets at high prices as a result of the substantial downturn in nuclear power generation that year.

The increase in taxes other than income taxes is also attributable to the France – Generation and supply segment. In 2022, the French Local Economic Contribution tax was exceptionally low, due to lower value added in 2022 caused by an increase in energy purchases observed in 2022 in a context of declining nuclear power output, and the purchase of 19.5TWh of electricity for the ARENH scheme.

The EU Inframarginal revenue cap on electricity production (CRI)

On 6 October 2022 the **European Union** adopted a regulation for harmonised action to address the energy price crisis. Among other measures, this regulation sets targets for reducing energy consumption during the winter of 2023, and introduces state aid for businesses and households, funded by a windfall tax on the fossil fuel sectors, and an inframarginal price cap on electricity production.

This inframarginal revenue cap is a compulsory tax measure requiring electricity producers to pay to the State all revenues above a threshold expressed in €/MWh. Under the EU regulation, this cap was applicable from 1 December 2022 to 30 June 2023 with a threshold of €180/MWh, but many EU member states decided to lengthen the application period and set different thresholds, well below the EU level, for different generation technologies.

In the **EDF group**, this regulation mainly concerns activities in France, Belgium and the United Kingdom.

In **France**, a 90% tax on inframarginal rents was introduced for three periods: July - November 2022, December 2022-June 2023, and July - December 2023. Any deficit in one period could be carried over to the next. This tax was renewed for the period 1 January 2024 to 31 December 2024 by article 80 of France's Finance Law for 2024.

Separate inframarginal rent thresholds (in €/MWh) are set for each electricity generation technology (8 different categories), principally €90/MWh for nuclear power, €100/MWh for wind and solar power, €80-€140/MWh for hydropower (depending on the power of each plant). France has also opted to tax gas-fired electricity generation plants (including cogeneration plants), which are subject to caps of €40-€110/MWh, plus fuel costs.

Consequently, in the EDF group in **France** in 2023, the inframarginal revenue cap concerns EDF SA and the French entities of Dalkia (€9 million in 2023, €14 million in 2022), and EDF Renewables (€12 million in 2023, €37 million in 2022), respectively for their cogeneration and renewable energy output.

EDF SA made a significant loss (that could be carried forward) for the first period in 2022, and also for the month of December 2022, reflecting purchases made on high-price markets due to the very substantial downturn in nuclear power output (-81,7 TWh) over that period. Due to the carry-forward mechanism, EDF does not expect to pay any tax on inframarginal rents for 2023.

In **Belgium**, the inframarginal revenue cap concerns EDF's nuclear and renewable power output: the liability amounted to €146 million in 2023 in application of the country's 100% tax above a threshold of €130/MWh.

In **Italy**, the Group was concerned by windfall taxes in 2022 which no longer existed in 2023 (see note 9).

Other similar mechanisms in the Group

The **United Kingdom** introduced a 45% tax on revenues in excess of £75/MWh tax from electricity generation (the Electricity Generator Levy) applicable from 1 January 2023. It is payable by entities producing electricity from coal, renewable and nuclear sources but does not apply to gas-fired power plants. This tax is scheduled to apply until 30 March 2028 and generated an expense of €400 million for EDF Energy in 2023.

5.5 Other operating income and expenses

Other operating income and expenses comprise:

(in millions of euros)	Notes	2023	2022
Operating subsidies	5.5.1	14,493	1,055
Net income on deconsolidation	5.5.2	55	168
Gains on disposal of fixed assets	5.5.2	(228)	(167)
Net increase/decrease in provisions on current assets	5.5.3	(702)	(307)
Net increase in provisions for operating contingencies and losses ⁽¹⁾		(77)	(1,059)
Other items	5.5.4	(2,313)	677
OTHER OPERATING INCOME AND EXPENSES		11,228	367

⁽¹⁾ see notes 15.1.1 and 17.2.

5.5.1 Operating subsidies

This item mainly comprises the subsidy received or receivable by EDF in respect of the compensation for public energy service charges, reflected in the financial statements through recognition of income of €14,126 million for 2023 (€808 million in 2022). The public service charges to be covered in 2023 include an amount of €13,992 million in compensation for the lower sales revenues resulting from limits on the sale prices to final customers introduced by the authorities through tariff caps for electricity and gas and “electricity buffer” mechanisms (see note 5.1.1). However, the charges to be covered for renewable energy support were once again negative in 2023, because market prices were high and generally above the price of EDF's purchase obligation.

Compensation for public energy charges (CSPE) (France)

Mechanism

The compensation mechanism for public energy service charges (*compensation des Charges de Service Public de l'Energie*) resulted from a reform introduced by France's amended Finance Law for 2015, but since 1 January 2021 public energy service charges have been compensated through the State's general budget.

In compensation for the 2023 charges, France's initial Finance Law for 2023 introduced an €8.4 billion “public energy service” budget (P345) to cover additional costs (purchase obligations and additional remuneration) incurred on support contracts for renewable energies and biogas, expenses associated with the electricity and gas tariff caps (see note 5.1.1), solidarity charges borne by gas and electricity suppliers, costs associated with support for non-renewable energy production (essentially cogeneration), and the cost of applying the standard national tariffs to zones that are not connected to France's mainland network.

Income generated by the excise duty on electricity (previously named the domestic tax on the final consumption of electricity (TICFE), and shown on customer invoices as the “Contribution to the public energy service” (CSPE)) goes directly into the general budget. This excise duty is received directly from final consumers of electricity through an additional levy on the electricity sale price (collected by their suppliers), or directly from electricity producers that produce electricity for their own uses.

The level of this tax was set at a full rate of €32/MWh for residential users. The law also defines a special rate, reduced rates and exemptions for businesses depending on their activity and consumption levels. However, France's electricity tariff cap then effectively reduced the tax to its minimum level of €1/MWh for residential customers and €0.5/MWh for business customers.

In accordance with decree 2016 - 158 of 18 February 2016 concerning compensation for public service energy charges, the CRE published two decisions in 2023 (decision n°2023 - 200 of 20 July and decision 2023 - 293 of 21 September), setting out a forecast of EDF's public service charges for 2024, a revised forecast of charges for 2023, and the actual charges recorded for 2022.

5.5.2 Net income on deconsolidation and gains on disposal of fixed assets

In 2023, net income on deconsolidation and gains on disposal of property, plant and equipment includes gains on sales of EDF Renewables' generation assets as part of the Development and Sale of Structured Assets (DSSA) activities, amounting to €48 million (€192 million in 2022).

5.5.3 Net increase and decrease in provisions on current assets

In 2023, the net increase/decrease in provisions on current assets principally concerns trade receivables in the United Kingdom and France, and €230 million of provisions on the coal stock at the Cordemais power plant in France as the consumption forecast at the end of 2023 was substantially lower than in 2022.

5.5.4 Other items

Other items mainly include costs incurred to obtain energy savings certificates, losses on non-recoverable operating receivables, French hydropower concession fees and additional remuneration paid to producers of electricity from renewable sources in France.

The additional remuneration paid to electricity producers using renewable energies was introduced by France's law on the Energy Transition for green growth. It is a support mechanism intended to guarantee reasonable remuneration for producers who sell their energy directly on the markets, by compensating for the differential between the revenues from those sales and a reference amount. Conversely, when these revenues are higher than the reference amount, the producer must repay the differential received. This mechanism complements the purchase obligation system in France.

Other items also include expenses and income related to closure of the Fessenheim plant at 31 December 2023 mainly comprising:

- expenses of €93 million (salaries and social security charges for labour at the site amounting to €45 million, purchases of goods and services amounting to €43 million, taxes other than income taxes, mainly payroll taxes, energy taxes and local taxes amounting to €5 million);
- the compensation defined in the protocol for expenses that will be incurred after the closure, amounting to €43 million, recognised as an operating subsidy in the income statement as explained above.

Closure of Fessenheim nuclear power plant

In accordance with the application for termination of operations and the declaration of the permanent shutdown of both reactors at Fessenheim nuclear power plant sent by EDF to the Minister for the Ecological and Inclusive Transition and to the ASN on 30 September 2019, EDF shut down reactor 1 on 22 February 2020 and reactor 2 on 30 June 2020.

On 27 September 2019, due to the cap on nuclear power output set by the “energy transition for green growth” law of 17 August 2015, the French State and EDF signed a protocol agreement whereby the State will compensate EDF for the early closure of Fessenheim.

The compensation paid under the terms of this protocol comprises:

- Initial instalments to compensate for expenses incurred after the closure of the plant (end-of-operations expenditure, BNI taxes, dismantling costs and staff redeployment costs), which will essentially be paid over a 4-year period following the closure. An amount of €370 million was received on 14 December 2020 (see note 13.5);

This compensation is recognised as income in profit and loss as and when the associated costs are incurred;

- Subsequent payments corresponding to the lost income that would have been generated by future power generation up until 2041, based on Fessenheim’s previous output figures and calculated “ex post” on the basis of nuclear power sale prices, particularly observed market prices. There is no reason to recognise such income in the financial statements at this stage.

Once decoupled from the network, the Fessenheim plant entered a post-operating phase of approximately five years. Units 1 and 2 continue to be operated and maintained as “defueled core” and “evacuated fuel” reactors. This requires a series of technical and administrative operations. By the end of 2022, all the spent fuel had been removed to La Hague, and decontamination of the nuclear zone had been finalised by 31 December 2023. The dismantling decree for Fessenheim is expected to be issued in 2026.

ENERGY SAVINGS CERTIFICATES

ACCOUNTING PRINCIPLES AND METHODS

In France, the Law of 13 July 2005 introduced a system of energy savings certificates. Suppliers of energy (electricity, gas, heat, cold, domestic fuel oil and fuel for vehicles) with sales above a certain level became subject to energy savings obligations, initially for a three-year period.

To meet this obligation, three sources are available to the EDF group: supporting consumers in their energy efficiency operations, funding State-approved energy savings certificate schemes, and purchasing certificates on the secondary market.

Expenses incurred for this purpose are recorded in expenses of the year concerned, in “Other operating income and expenses”. Expenses in excess of the accumulated obligation at year-end are included in inventories and may be used to cover the obligation in later years.

A provision is recognised if the volume of energy savings certificates obtained is lower than the cumulative energy savings obligation at the year-end. The amount of the provision is equal to the cost of actions still to be taken to extinguish the obligations related to the energy sales made.

ENERGY SAVING REGULATIONS IN FRANCE

The fifth period of France’s energy savings certificates scheme (2022-2025) began on 1 January 2022. Decree 2021-712 tightened up the scheme (for example by significantly reducing special measures and bringing calculations closer to the real savings), and directs more funding to very vulnerable households (raising the “energy poverty” obligations, restriction of the scope to very vulnerable households, an increase in the penalties in this category to €20/MWhc).

However, to reinforce the dynamic, the DGEC issued a decree just ten months after the fifth period began (decree 2022-1368 of 27 October 2022) that raised the scheme obligation for the period from 1 January 2023 as follows:

- “Standard” obligation: 1970TWhc vs 1770TWhc initially, and +200TWhc for the period 2023 - 2025;
- “Energy poverty” obligation: 1130TWhc vs 730TWhc initially, and +400TWhc for the period 2023 - 2025.

These regulatory changes in the course of the period create greater instability in the energy savings certificates scheme for the actors concerned. At 31 December 2023, the EDF Group had met its obligation for the fifth period of the scheme (2022-2025).

Note 6 Net changes in fair value on energy and commodity derivatives, excluding trading activities

ACCOUNTING PRINCIPLES AND METHODS

This item essentially consists of changes over the period in the fair value of derivatives used for economic hedging of commodity purchases or sales that are not eligible for hedge accounting as defined in IFRS 9, and are therefore included directly in profit and loss. The Group reports these changes in a specific line of the income statement, "Net changes in fair value on Energy and Commodity derivatives, excluding trading activities" below the operating profit before depreciation and amortisation.

(in millions of euros)	2023	2022
NET CHANGES IN FAIR VALUE ON ENERGY AND COMMODITY DERIVATIVES, EXCLUDING TRADING ACTIVITIES	363	(849)

Net changes in fair value on Energy and Commodity derivatives, excluding trading activities, stood at €(849) million at 31 December 2022 then €363 million at 31 December 2023. This change was principally due to lower price volatility in 2023 as commodity prices followed a downward trend, in contrast to 2022.

Note 7 Other income and expenses

Other income and expenses amount to €(2 944) million for 2023. They principally comprise:

- an exceptional additional allocation of €(1,073) million to provisions for spent fuel management, in view of the agreement signed in September 2023 with Orano Recyclage fixing the principles of future amendments for the period 2024-2026 (see note 15.1.1.1);
- an allocation of €(525) million to Edison's provisions for environmental litigation;
- exceptional additional costs totalling €(499) million, relating to repair work on the main secondary circuit welds at the Flamanville 3 EPR (these are abnormal costs under IAS 16.22 and cannot be included in the cost of assets under construction);
- an increase of €(345) million to provisions following the final agreement signed on 13 December 2023 between Engie and the Belgian government concerning all nuclear waste-related obligations (see note 15.1);
- a past service cost of €(338) million resulting from the pension plan amendment introduced by France's pension reform;
- a provision of €(162) million for surplus costs related to the design of the Hinkley Point C project, to be reimbursed to CGN under a specific agreement;
- income of €92 million resulting from the United Kingdom's pension cap.

In 2022, other income and expenses amounted to €(687) million. They principally comprised:

- exceptional additional costs relating to work for repairs to the main secondary circuit welds at the Flamanville 3 EPR, totalling €(638) million;
- the expense of the Employee Reserved Offer (ERO) during the period, amounting to €(64) million;
- the gain on sale of EDF Energy Services LLC (the energy sales activity of EDF Trading North America, see note 3.1) and Dalkia Russia, and the compensation paid to partners amounting to a net €68 million;
- provisions relating to proceedings before the civil, administrative and criminal courts concerning the sale by Montedison of Ausimont (the Bussi site) in Italy to Solvay in 2002 (see note 17.3.5).

Note 8 Financial result

8.1 Cost of gross financial indebtedness

Details of the components of the cost of gross financial indebtedness are as follows:

(in millions of euros)	2023	2022
Interest expenses on financing operations ⁽¹⁾	(3,924)	(1,940)
Change in the fair value of derivatives and hedges of liabilities	17	(31)
Transfer to income of changes in the fair value of cash flow hedges	(34)	89
Net foreign exchange gain on indebtedness	111	152
COST OF GROSS FINANCIAL INDEBTEDNESS	(3,830)	(1,730)

⁽¹⁾Including interest on the lease liability amounting to €(100) million in 2023 and €(77) million in 2022.

Interest expenses on financing operations increased by €1,984 million. This increase is explained by an interest rate effect as rates rose, and to a lesser degree the effect of the higher volume of debt.

8.2 Discount effect

The effect of winding the discount primarily concerns provisions for the back-end of the nuclear cycle, decommissioning and last cores, and long-term and post-employment employee benefits.

Details of the final discount effect are as follows:

(in millions of euros)	2023	2022
Provisions for long-term and post-employment employee benefits ⁽¹⁾	(1,337)	(663)
Provisions for the back-end of the nuclear cycle, decommissioning and last cores ⁽²⁾	(2,603)	770
Other provisions and advances	(48)	67
DISCOUNT EFFECT	(3,988)	174

⁽¹⁾See note 16.1.3.

⁽²⁾Including the effect of discounting the receivable corresponding to amounts reimbursable by the NLF (see note 18.1.3).

The increase in the discount effect on provisions for long-term and post-employment employee benefits in 2023 is explained by the higher discount rate applicable at 1 January 2023 (in France: 3.9%, against 1.6% at 1 January 2022), partly offset by a lower volume of commitments at 1 January 2023.

The increase in the discount expenses on nuclear provisions in 2023 results mainly from a rate effect of €(2,533) million attributable to the stability of the real discount rate in France over the period (2.5%), after the 50 base point increase in the discount rate in 2022 (see note 15.1). The cost of unwinding the discount in 2022 was more than offset by a favourable discount effect caused by this change in the rate.

8.3 Other financial income and expenses

Other financial income and expenses comprise:

(in millions of euros)	2023	2022
Financial income on cash and cash equivalents	293	95
Gains/(losses) on other financial assets (including loans and financial receivables)	374	311
Gains/(losses) on debt and equity securities	760	345
Changes in financial instruments carried at fair value through profit and loss	2,058	(3,272)
Other financial expenses	(403)	(433)
Foreign exchange gain/loss on financial items other than debts	(143)	75
Return on fund assets	708	419
Capitalised borrowing costs	822	463
OTHER FINANCIAL INCOME AND EXPENSES	4,469	(1,997)

“Gains/(losses) on debt and equity securities” in 2023 principally include:

- €877 million of dividends and interest income on debt securities (€467 million in 2022);
- €(118) million of net gains and losses on sales of debt securities carried at fair value through OCI with recycling (including €(101) million on dedicated assets), compared to €(122) million in 2022 (including €(68) million on dedicated assets).

In 2023, other financial income and expenses include changes in the fair value of financial instruments, amounting to €2,058 million (€(3,272) million in 2022) in a market environment that remained volatile. €2,220 million of this change related to the fair value of dedicated assets (€(3,096) million in 2022).

Note 9 Income taxes

ACCOUNTING PRINCIPLES AND METHODS

Income taxes include the current tax expense (income) and the deferred tax expense (income), calculated under the tax legislation in force in the countries where earnings are taxable.

In compliance with IAS 12, current and deferred taxes are generally recorded in the income statement or in equity symmetrically to the underlying operation.

In application of IFRS 9, the Group considers that payments made to holders of perpetual subordinated bonds qualify as “dividends” under the definition given in the standard. Consequently, in compliance with IAS 12, the tax effects of such distributions are included in profit and loss of the relevant period, in the same way as the effects of dividend payments.

In application of IFRIC 23, a tax asset or liability is recognised when there is uncertainty over income tax treatments. If the Group considers it likely that the tax authorities will not accept its chosen treatment, it recognises a tax liability, and if it considers it likely that the tax authorities will reimburse a tax that has already been paid, it recognises a tax asset. The tax assets and liabilities relating to these uncertainties are estimated on a case-by-case basis and stated at the most likely amount, or the weighted average of the various outcomes considered. These tax assets and liabilities are included in deferred taxes.

The current tax expense (income) is the estimated amount of tax due on the taxable income for the period, calculated using the tax rates adopted at the year-end.

Deferred taxes result from temporary differences between the book value of assets and liabilities and their tax basis, except in specific cases defined in IAS 12, for which no deferred taxes are recognised..

Deferred tax assets and liabilities are valued at the expected tax rate for the period in which the asset will be realised or the liability extinguished, based on tax rates adopted at the year-end. If the tax rate changes, deferred taxes are adjusted to the new rate and the adjustment is recorded in the income statement, unless it relates to an underlying for which changes in value are recorded in equity, for example in accounting for actuarial gains and losses or fair value on hedging instruments and debt or equity securities.

Deferred taxes are reviewed at each closing date, to take into account changes in tax legislation and the prospects for recovery of deductible temporary differences. Deferred tax assets are only recognised when it is probable that the Group will have sufficient taxable profit to utilise the benefit of the asset in the foreseeable future, or beyond that horizon, if there are deferred tax liabilities with the same maturity.

Deferred tax assets and liabilities are reported on a net basis, determined at the level of a tax entity or tax group.

Pillar two rules

To address concerns about declining corporate income tax bases and the shifting of taxable profits between States by large multinational companies, a worldwide agreement to introduce a minimum corporate tax rate has been reached in 2021 by more than 135 countries. In December 2021, the Organisation for Economic Co-operation and Development (OECD) published a proposed reform of international tax rules, notably including the introduction of a minimum 15% tax rate on profits of multinational groups (the “Pillar Two Rules”).

Following the European Union’s adoption of the “Pillar Two” directive on 15 December 2022, on 20 December the OECD published simplified procedures which will only apply for financial years beginning on or before 31 December 2026 (which in practice for the Group means financial years 2024 to 2026). During that transition period, provided certain requirements are met in the country of operation, groups may be exempt from calculating top-up tax under the Pillar Two rules.

France’s Finance Law for 2024 has transposed these new rules into French legislation. The first application will be in 2024, with the first declaration to be filed in June 2026.

During 2023, the Group continued its work to implement and evaluate the Pillar 2 rules. Based on the legislation applicable in France, the tax rates currently in force in the countries where the Group has operations, and subject to the Group developing new businesses or the law changing in the relevant countries before the Pillar Two rules take effect, the Group does not expect these rules to have any significant income tax impacts.

9.1 Breakdown of tax expense

The tax income / (expense) breaks down as follows:

(in millions of euros)	2023	2022
Current tax expense	(3,887)	(1,894)
Deferred taxes	1,417	5,820
TOTAL	(2,470)	3,926

In 2023, €(2,167) million of the current tax expense relates to French companies, and €(1,720) million relates to foreign subsidiaries (€(562) million and €(1,332) million respectively in 2022).

9.2 Reconciliation of the theoretical and effective tax expense (tax proof)

(in millions of euros)	2023	2022
Income of consolidated companies before tax	9,825	(22,916)
Income tax rate applicable to the parent company	25.82%	25.82%
Theoretical tax expense	(2,537)	5,917
Differences in tax rate ⁽¹⁾	(61)	145
Permanent differences ⁽²⁾	(1,188)	(336)
Taxes without basis ⁽³⁾	253	(478)
Unrecognised deferred tax assets ⁽⁴⁾	1,062	(1,320)
Other	1	(2)
ACTUAL TAX EXPENSE	(2,470)	3,926
EFFECTIVE TAX RATE	25.13 %	17.13%

The income tax expense amounts to €(2,470) million at 31 December 2023, corresponding to an effective tax rate of 25.13% (compared to an income tax credit of €3,926 million in 2022, corresponding to an effective tax rate of 17.13%).

The €(6,396) million change between the tax income in 2022 and the tax expense in 2023 essentially reflects the €32,741 million increase in the Group’s pre-tax income, generating additional tax of €(8,454) million.

The change in the income tax expense in 2023 is also affected by impairment in the United Kingdom, although that effect is partly offset by recognition of deferred tax assets on the loss reported in 2022 by the French tax group (EDF SA, Enedis, PEI and other French subsidiaries owned more than 95%), and the absence in 2023 of tax litigation and unfavourable effects of the windfall tax on electricity-producing companies introduced in Italy in 2022.

At 31 December 2022, the French tax group's loss gave rise to partial recognition of a deferred tax asset since the prospects of recovery within a 10-year horizon were uncertain, but after a reassessment at 31 December 2023 of its ability to recover this tax loss, the Group recognised an additional deferred tax asset of €1,060 million such that the entire 2022 tax loss is now recognised. After elimination of these non-recurring items (principally impairment and unrealised gains and losses on financial assets and commodities), the effective current tax rate for 2023 is 20.6%, compared to 18.0% in 2022.

The main factors explaining the difference between the theoretical tax rate and this effective rate are:

- 2023:
 - ⁽¹⁾ the unfavourable €(62) million impact of tax rate differences in Italy, where the normative tax rate applicable in 2023 is 27.9%;
 - ⁽²⁾ the unfavourable impacts in the United Kingdom of impairment (€(1,020) million) and the Electricity Generator Levy, a 45% tax on electricity generators' windfall revenues, which will apply until 31 March 2028 (€(100) million);
 - ⁽³⁾ the favourable impact of deduction of the payments made to bearers of perpetual subordinated bonds, amounting to €164 million;
 - ⁽⁴⁾ the favourable impacts of recognition and reversals of impairment of deferred tax assets of the tax group in France (€938 million) (including €1,060 million relating to the loss reported in 2022), and in the United States (€182 million) (see note 9.4).
- 2022:
 - ⁽¹⁾ the favourable impact of tax rate differences amounting to €145 million, mainly relating to the United Kingdom where the normative tax rate applicable in 2022 is 19%;
 - ⁽²⁾ provisions and impairment amounting to €(279) million;
 - ⁽³⁾ the unfavourable impact of windfall taxes in Italy (€(317) million), and tax litigation (€(346) million), partly offset by the favourable impact of deduction of the payments made to bearers of perpetual subordinated bonds, amounting to €156 million;
 - ⁽⁴⁾ the effect of non-recognition of deferred tax assets, amounting to €(1,320) million including €(1,551) million relating to the French tax group (see note 9.4), partly offset by the favourable effect of deferred tax assets recognised in the United States, amounting to €296 million.

9.3 Change in deferred tax assets and liabilities

(in millions of euros)	2023	2022
Deferred tax assets	8,696	1,667
Deferred tax liabilities	(1,533)	(2,401)
Net deferred taxes at 1 January	7,163	(734)
Change in net income	1,417	5,820
Change in equity	(2,040)	2,323
Translation adjustments	(28)	79
Changes in scope of consolidation	(78)	13
Other movements	(9)	(338)
NET DEFERRED TAXES AT 31 DECEMBER	6,425	7,163
Deferred tax assets	7,403	8,696
Deferred tax liabilities	(978)	(1,533)

In 2023, the change in deferred taxes in equity includes €199 million of actuarial gains and losses on post-employment benefits (€(558) million in 2022) and €(2,216) million of changes in the fair value of hedges (€(1,181) million in 2022).

9.4 Breakdown of deferred tax assets and liabilities by nature

(in millions of euros)	31/12/2023	31/12/2022
Deferred taxes:		
Fixed assets and right-of-use assets ⁽¹⁾	(5,114)	(6,946)
Provisions for employee benefits	3,938	3,927
Other provisions and impairment	216	778
Financial instruments	509	2,401
Tax loss carryforwards and unused tax credits	7,915	9,555
Lease liabilities ⁽¹⁾	838	845
Other	544	497
Total deferred tax assets and liabilities	8,846	11,057
Unrecognised deferred tax assets	(2,421)	(3,894)
NET DEFERRED TAXES	6,425	7,163

⁽¹⁾ Due to application of the amendments to IAS 12, deferred tax assets and liabilities associated with leases, amounting to €845 million, are shown separately from deferred tax assets and liabilities associated with decommissioning costs, amounting to €37 million at 31 December 2022. The presentation used for deferred tax assets and liabilities in 2022 has been adjusted accordingly by €882 million, with no impact on the total deferred assets reported in the balance sheet.

At 31 December 2023, unrecognised deferred tax assets represent a potential tax saving of €2,421 million (€3,894 million at 31 December 2022), mainly relating to France, Italy and the United States.

The potential tax saving in France, amounting to €1,709 million (€2,952 million in 2022) essentially relates to the stock of deferred tax assets on employee benefits. These deferred tax assets have no time limit. Some of the corresponding deferred taxes are unrecognised, in application of the Group's conservative policy for recognition of deferred taxes beyond a 10-year horizon.

The potential tax saving in Italy, amounting to €308 million (€309 million in 2022), relates to the tax value of goodwill, which was revised in 2021 and is amortisable over 50 years for tax purposes. Some of the corresponding deferred tax assets are unrecognised due to the Group's conservative policy for recognition of deferred taxes beyond a 10-year horizon.

The potential tax saving in the United States, amounting to €287 million (€490 million in 2022) relates mainly to tax losses that can be carried forward until dates between 2026 and 2037 (this concerns losses generated before 31 December 2017, and long-term capital losses), or for an unlimited period (for losses generated after 2017).

Recognised deferred tax assets on tax loss carryforwards and unused tax credits amount to €7,538 million (€7,898 million in 2022) and principally concern France (€6,190 million in 2023, €6,890 million in 2022), the United States (€561 million in 2023, €430 million in 2022), and the United Kingdom (€475 million in 2023, €306 million in 2022).

In France, they include a deferred tax asset of €6,103 million recognised in connection with the loss reported in 2022 by the French tax group (EDF SA, Enedis, PEI and other French subsidiaries owned more than 95%), which has not yet been utilised.

Based on the projected future tax results of the French tax group, the gross deferred tax asset of €6,103 million is expected to be recovered over a period of less than 10 years, and this led to reversal of the provision previously booked. These projections take account of the Group's 2024 Budget as approved by the Board of Directors and the Group's internal financial trajectory, including the agreement of 14 November 2023.

In the United States and United Kingdom, deferred tax assets on tax loss carryforwards and tax credits were recognised due to the existence of deferred tax liabilities in the same entities that will reverse over the same time horizons, or because taxable profits are expected.

Note 10 Property, plant and equipment and intangible assets (excluding French public electricity distribution concession assets)

Details of property, plant and equipment and intangible assets (excluding French electricity distribution concession assets) are as follows:

(in millions of euros)	Notes	31/12/2023	Assets in progress ⁽¹⁾	31/12/2022	Assets in progress ⁽¹⁾
Goodwill	10.1	7,895	n.a.	9,513	n.a.
Other intangible assets	10.2	11,300	2,600	10,619	2,110
Property, plant and equipment used in generation and other tangible assets, including right-of-use assets	10.3	100,587	46,735	101,126	49,700
<i>Right-of-use assets</i>	10.4	4,173	n.a.	4,051	n.a.
Property, plant and equipment operated under concessions other than French electricity distribution concessions	10.5	6,544	775	6,816	668
TOTAL PROPERTY, PLANT AND EQUIPMENT AND INTANGIBLE ASSETS (EXCLUDING FRENCH ELECTRICITY DISTRIBUTION CONCESSION ASSETS)		126,326	50,110	128,074	52,478

n.a.: not applicable.

⁽¹⁾Assets in progress are presented in note 10.6.

10.1 Goodwill

ACCOUNTING PRINCIPLES AND METHODS

DETERMINATION OF GOODWILL

In application of IFRS 3, "Business combinations" (see note 3), goodwill is the difference between:

- the sum of the following items:
 - the acquisition-date fair value of the price paid to acquire control;
 - the value of non-controlling interests in the entity acquired; and
 - for acquisitions achieved in stages, the acquisition-date fair value of the Group's share in the acquired entity before it acquired control; and
- the net value of the assets acquired and liabilities assumed, measured at fair value at the acquisition date.

When this difference is negative it is immediately included in net income.

The fair values of assets and liabilities and the resulting goodwill are finalised within twelve months of the acquisition.

MEASUREMENT AND PRESENTATION OF GOODWILL

Goodwill on acquisition of subsidiaries is disclosed separately in the balance sheet. Impairment on this goodwill is reported under the heading "Impairment" in the income statement. After initial recognition, goodwill is carried at cost less any impairment recognised.

Goodwill on acquisition of associates and joint ventures is included in the investment's net book value. Impairment on this goodwill is included under the heading "Share in income of associates and joint ventures".

Goodwill is not amortised, but impairment tests are carried out as soon as there is an indication of possible loss of value, and at least annually, as described in note 10.8.

In 2023, goodwill primarily related to EDF Energy (€4,901 million net of the impairment recognised in 2023) and Framatome (€1,475 million). The breakdown by operating segment is presented in note 4.1.

Changes in goodwill in 2023 and 2022 were as follows:

(in millions of euros)	31/12/2023	31/12/2022
Net book value at opening date	9,513	10,945
Acquisitions	43	154
Disposals	(24)	(2)
Impairment (note 10.8)	(1,779)	(1,178)
Translation adjustments	134	(379)
Other changes	8	(27)
NET BOOK VALUE AT CLOSING DATE	7,895	9,513
Gross value at closing date	11,832	11,650
Accumulated impairment at closing date	(3,937)	(2,137)

The changes in goodwill in 2023 primarily related to:

- impairment of €(1,773) million on the goodwill of EDF Energy;
- translation adjustments (€134 million), mainly resulting from the appreciation of the pound sterling against the Euro.

The changes in goodwill in 2022 primarily related to:

- impairment of €(1,176) million on the goodwill of EDF Energy;
- translation adjustments (€(379) million), mainly resulting from the decline of the pound sterling against the Euro.

10.2 Other intangible assets

ACCOUNTING PRINCIPLES AND METHODS

GENERAL PRINCIPLES

Other intangible assets mainly comprise:

- software, which is amortised on a straight-line basis over its useful life, including SaaS (Software as a Service) contracts which are not treated as service contracts and included in expenses. To qualify for treatment as fixed assets, SaaS contracts must confer a right of control to the user in addition to access to the software for a fixed period;
- development costs that qualify for capitalisation under IAS 38 amortised on a straight-line basis over their foreseeable useful life;
- purchased brands with an indefinite useful life, or amortised on a straight-line basis over their useful life;
- operating or usage rights for power plants, which are amortised on a straight-line basis over the useful life of the underlying asset;
- the positive value of energy purchase/sale contracts stated at fair value as part of a business combination governed by IFRS 3: this value is amortised as the contractual deliveries take place;
- assets related to concession contracts governed by IFRIC 12, under the “intangible model” (see note 10.5);
- technology related to activities as designer and supplier of nuclear steam supply systems and manufacturer of control rod clusters and nuclear fuel (Framatome) including codes and methods, EPR technology, patents and manufacturing processes, all amortised over their useful life;
- purchased customer contracts and relations, amortised over their useful life;
- incremental costs of winning or renewing customer contracts, which are amortised over the average duration of customer contracts;
- intangible assets related to environmental regulations.

INTANGIBLE ASSETS RELATING TO ENVIRONMENTAL REGULATIONS

These include greenhouse gas emission certificates and renewable energy certificates purchased (see notes 20.1.1 and 20.1.2).

Greenhouse gas emission certificates

EU Directive 2003/87/EC set up a greenhouse gas emission quota system for the European Union. The UK has its own emissions trading scheme (UK ETS) which has been in operation since 1 January 2021.

This quota system was incorporated into national laws. Among other things it requires obligated actors, which is the case of EDF, to surrender to the State a number of greenhouse gas emission credits each year, corresponding to their emissions for the year.

In the EDF group, the entities subject to these regulations are EDF, EDF Energy, Edison, Dalkia, and Luminus.

The accounting treatment of emission certificates depends on the holding intention. Two economic models coexist in the Group:

- Certificates held under the “Trading” model are included in “Other inventories” at fair value. The change in fair value observed over the year is recorded in the income statement;
- Certificates held to comply with regulatory requirements on greenhouse gas emissions (the “Generation” model) are recorded in other intangible assets:
 - at acquisition cost when purchased on the market,
 - at nil value when allocated free of charge (in countries that still have a free allocation system).

A provision corresponding to emissions for the year is established at the year-end (see note 17.2).

This provision is equal to the acquisition cost up to the amount of certificates acquired on forward markets, and by reference to market prices for the balance. It is cancelled when the certificates are surrendered to the State.

At the closing date, the certificates held and the obligation to surrender certificates for the emissions of the year are presented gross, without netting.

If the number of emission certificates at the end of the year not subject to forward sale is higher than the number of certificates to be surrendered to the State for the year's emissions, an impairment test is applied to the excess and impairment is recognised if the net book value exceeds the market value.

Renewable energy certificates (green certificates)

In application of EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources, every EU member state has set national targets for consumption of electricity from renewable sources. The UK has its own equivalent system.

States can use two possible mechanisms to meet these targets:

- introducing a specific sales tariff for energy from renewable sources (this system is used in France and Italy);
- introducing a system of renewable energy certificates to be surrendered by energy suppliers (this system is used in the United Kingdom (Renewable Obligation Certificates) and Belgium (*Certificats verts*)).

For renewable energy certificate systems, the Group applies the following accounting treatment:

- certificates earned through energy generation are not recognised, since their cost is nil;
- certificates purchased are recognised as intangible assets in the line “Greenhouse gas emission rights - green certificates”;
- a provision is established to reflect the obligation to surrender certificates. It is based on the cost of certificates earned (with nil value) and purchased (on the spot or forward market), the market price of the certificates still be purchased, and where relevant the market penalty price for the balance. The provision is cancelled when the certificates are surrendered to the State (see note 17.2).

The net value of other intangible assets breaks down as follows:

(in millions of euros)	31/12/2022	Acquisitions	Disposals	Translation adjustments	Changes in scope ⁽²⁾	Other movements	31/12/2023
Software	7,605	927	(631)	18	-	45	7,964
Positive fair value of commodity contracts acquired in a business combination	504	-	-	-	-	-	504
Greenhouse gas emission certificates – green certificates	979	1,365	(1,351)	8	-	7	1,008
Other intangible assets	8,394	739	(53)	12	(146)	(117)	8,829
Intangible assets in development ⁽¹⁾	2,110	512	(28)	-	2	4	2,600
Gross value	19,592	3,543	(2,063)	38	(144)	(61)	20,905
Software	(4,968)	(870)	619	(16)	-	(14)	(5,249)
Positive fair value of commodity contracts acquired in a business combination	(266)	(25)	-	-	-	-	(291)
Other intangible assets	(3,739)	(540)	70	(12)	110	46	(4,065)
Accumulated amortisation and impairment	(8,973)	(1,435)	689	(28)	110	32	(9,605)
NET VALUE	10,619	2,108	(1,374)	10	(34)	(29)	11,300

⁽¹⁾Increases in intangible assets in development are stated net of the effects of newly-commissioned assets. Intangible assets in development are detailed in note 10.6.

⁽²⁾ The changes in scope essentially concern reclassifications of gas storage assets in Italy and the United Kingdom as assets held for sale.

The gross value of other intangible assets (except intangible assets in development) at 31 December 2023 includes:

- Enedis' network map, amounting to €927 million (€814 million in 2022);
- the Edison brand and intangible assets related to Edison's hydropower concessions, amounting to €945 million and €489 million respectively;
- the Dalkia brand and intangible assets related to Dalkia's concession agreements in France, amounting to €130 million and €1,552 million respectively;
- the Framatome brand, Framatome's nuclear technology-related intangible assets and Framatome's customer contracts, amounting to €151 million, €493 million and €216 million respectively.

Net impairment of €(44) million was recorded in respect of other intangible assets in 2023 (€(65) million in 2022).

EDF's research and development expenses recorded in the income statement total €483 million for 2023 (€473 million in 2022).

10.3 Property, plant and equipment used in generation and other tangible assets by the Group

ACCOUNTING PRINCIPLES AND METHODS

Property, plant and equipment is recorded at acquisition or production cost:

- the cost of facilities developed in-house includes all labour and materials costs, and all other production costs that can be included in the construction of the asset;
- borrowing costs attributable to the financing of an asset incurred during the construction period are included in the value of the asset provided it is a qualifying asset as defined by IAS 23 "Borrowing costs";
- the cost of property, plant and equipment also includes the initial estimate of decommissioning costs. These costs are recognised in assets against the provision recognised to cover these obligations. At the date of commissioning, these assets are measured and recorded in the same way as the corresponding provision (see note 15);
- decommissioning costs for nuclear generation installations also include last core costs (see note 15).

When some of the decommissioning costs for a plant are to be borne by a partner, the expected reimbursement is recognised as accrued income in the assets.

The Group capitalises safety expenses incurred as a result of legal and regulatory obligations sanctioning non-compliance by an administrative ban from operation.

Strategic safety spare parts for generation facilities are treated as property, plant and equipment, and depreciated over the residual useful life of the installations.

The costs of operations that are necessary for generation assets to remain in service, and are undertaken at the time of scheduled shutdowns, particularly during major inspections, are capitalised and amortised over a period corresponding to the time elapsing between two inspections.

DEPRECIATION

Items of property, plant and equipment are depreciated on a straight-line basis over their useful life, defined as the period during which the Group expects to draw future economic benefits from their use.

When a part of an asset has a different useful life from the overall asset's useful life, it is identified as an asset component and depreciated over a specific period.

Depending on each country's specific regulations and contractual arrangements, the expected useful lives for the main facilities are as follows:

• nuclear generation facilities	40 to 50 years
• wind farm and photovoltaic facilities	20 to 25 years
• fossil-fired power plants (mainly CCGT-Combined Cycle Gas Turbine plants)	25 to 45 years
• transmission and distribution installations (lines, substations)	20 to 60 years
• other general plant and machinery	10 to 20 years

The net values of property, plant and equipment used in generation and other tangible assets are as follows:

(in millions of euros)	31/12/2022	Increases	Decreases	Translation adjustments	Changes in the scope of consolidation	Other movements	31/12/2023
Land and buildings	14,454	385	(67)	14	15	(240)	14,561
Nuclear power plants	79,559	4,576	(1,774)	195	-	240	82,796
Fossil-fired & hydropower plants	17,705	230	(66)	34	(20)	(5)	17,878
Other installations, plant, machinery, equipment & other	24,545	2,140	(527)	(146)	(175)	118	25,955
Right-of-use assets ⁽¹⁾	6,610	704	-	(13)	5	(149)	7,157
Assets in progress ⁽²⁾	49,887	8,035	(90)	459	12	(262)	58,041
Gross value	192,760	16,070	(2,524)	543	(163)	(298)	206,388
Land and buildings	(8,682)	(382)	62	(11)	-	245	(8,768)
Nuclear power plants	(55,381)	(3,490)	1,685	(124)	-	492	(56,818)
Fossil-fired & hydropower plants	(12,922)	(440)	63	(28)	331	(11)	(13,007)
Other installations, plant, machinery, equipment & other	(11,903)	(1,437)	515	6	(83)	(16)	(12,918)
Right-of-use assets ⁽¹⁾	(2,559)	(772)	-	3	(2)	346	(2,984)
Assets in progress ⁽²⁾	(187)	(11,190)	5	(13)	-	79	(11,306)
Depreciation and impairment	(91,634)	(17,711)	2,330	(167)	246	1,135	(105,801)
NET VALUE	101,126	(1,641)	(194)	376	83	837	100,587

⁽¹⁾See note 10.4.

⁽²⁾Increases in assets in progress are stated net of the effects of newly-commissioned assets. Assets in progress are detailed in note 10.6.

Increases in 2023 in assets relating to the Group's major projects are detailed in notes 10.6 and 10.7.

The value of nuclear power plants decreased by €(194) million, principally due to replacement of important components and major upgrades, particularly in connection with the *Grand Carénage* programme and regular inspections.

The increase in impairment on assets in progress (€(11,190) million) essentially concerns the Hinkley Point C project currently under construction in the United Kingdom, following the updated project schedule and cost (see note 10.8).

The changes observed in property, plant and equipment used in generation and other tangible assets include a €376 million translation adjustment (resulting from a €544 million rise by the pound sterling against the euro) and €837 million of other changes, mainly related to reestimation of provisions for decommissioning.

Changes in the scope of consolidation essentially concern Edison (€34 million) and EDF Renewables (€28 million).

Depreciation periods of nuclear plants in France

As stated in note 1.3.4.1, the depreciation period of nuclear power plants currently in operation in France, i.e. thirty-two 900MW reactors, twenty 1300MW reactors and four 1450MW reactors, is 50 years for 900MW-series plants (since 1 January 2016) and 1300MW-series plants (since 1 January 2021), and 40 years for N4-series plants which do not yet fulfil the conditions for a longer depreciation period.

Under France's multi-year energy programme (PPE, standing for *Programmation Pluriannuelle de l'Énergie*) for the period 2019-2028, adopted in April 2020, twelve French nuclear reactors are to be shut down by 2035. As this includes the shutdowns of two 900MW reactors in 2027 and 2028 ahead of their fifth 10-year inspection, an early shutdown scenario for two 900MW reactors was adopted. Its effects on nuclear provisions and depreciation in the Group's financial statements are not significant. Application of this scenario continued at 31 December 2023 while awaiting adoption of the next multi-year energy programme, which could take place in 2024 as part of the current revision of France's energy and climate strategy.

Depreciation period of Cordemais coal-fired plant in France

In view of France's Energy and Climate law of 8 November 2019, the end of the depreciation period for the Cordemais coal-fired plant was brought forward to 2026 at the 2021 year-end.

RTE, in its Projected Supply Estimate Report published on September 20, 2023, confirmed the need to keep the Cordemais plant in operation for the supply-demand balance in the west of France until Flamanville 3 is put into operation. EDF has started action to continue maintenance of the plant until 2027, and to limit its carbon footprint during that time. Work has therefore been done to allow the use of biomass in replacement of 20% of the coal in each of Cordemais' two reactors.

As the authorities have announced that the last remaining coal-fired plants in France should be totally converted to biomass by 2027, EDF has begun discussions with them to explore regulatory questions related to this prospect.

Until new regulatory measures are adopted, the end of the accounting depreciation period for Cordemais remains set at 2026.

10.4 Right-of-use assets

ACCOUNTING PRINCIPLES AND METHODS

Under IFRS 16, a contract is, or contains, a lease if it confers the right to control the use of an identified asset for a period of time in exchange for a consideration.

Identified arrangements that do not have the legal form of a lease contract but nonetheless convey the right to control the use of an asset or group of specific assets to the purchaser are classified as leases by reference to IFRS 16.

RECOGNITION OF A LEASE CONTRACT AS LESSEE UNDER IFRS 16

The Group's lease contracts as lessee essentially concern real estate assets (office and residential properties), industrial installations (land, wind farms) and to a lesser extent vehicles, IT and industrial equipment.

IFRS 16 requires leases to be recognised in the lessee's balance sheet when the leased asset is made available, in the form of a "right-of-use" asset, presented in "Property, plant and equipment used in generation and other tangible assets, including right-of-use assets" with a corresponding financial liability associated with the lease commitment, presented in "Current and non-current financial liabilities".

Upon initial recognition of a lease, the right of use and the lease liability are valued by discounting the future lease payments over the term of the lease, taking into consideration assumptions regarding the renewal or termination of leases if the relevant options are reasonably certain to be exercised.

As a rule, since the implicit interest rate in a lease is difficult to determine, the lessee's incremental borrowing rate is used to discount the lease liability. This rate is based on zero-coupon EDF bond rates, adjusted for the currency risk, a country risk premium, the term of the lease contracts and the subsidiary's credit risk at the date of initial recognition of the contract. In certain cases, it is based on a subsidiary's specific incremental borrowing rate.

Subsequently, the right of use is amortised over the expected term of the lease, while the lease liability is stated at amortised cost, *i.e.* adding the interest recognised in the financial result, and deducting the amount of the lease payments made.

The Group applies the two exemptions allowed by IFRS 16, and as a result leases with a term of 12 months or less and leases of assets with individual value when new of less than USD 5,000 are not recognised in the balance sheet. Consequently, the payments on these leases are recognised on a straight-line basis over the lease term in the income statement.

Off-balance sheet commitments presented in note 21.1.1 concern:

- short-term leases (12 months or less);
- leases of assets with low value (less than USD 5,000 when new);
- leases signed for which the leased assets have not yet been made available (for example, assets under construction).

RECOGNITION OF A LEASE CONTRACT AS LESSOR

The accounting treatment of a lease contract in which the Group is lessor depends on the classification of the contract. For a finance lease which transfers substantially all risks and rewards inherent to ownership of the underlying asset to the lessee, the Group recognises a financial asset in its balance sheet instead of the initial fixed asset; in this case, the receivable is equal to the discounted value of future lease payments.

10.4.1 Change in right-of-use assets

(in millions of euros)	31/12/2022	Increases ⁽¹⁾	Decreases	Changes in the scope of consolidation	Other movements ⁽²⁾	31/12/2023
Land and buildings	5,502	482	-	3	(51)	5,936
Other installations, plant, machinery, equipment & other	1,108	222	-	2	(111)	1,221
Gross value	6,610	704	-	5	(162)	7,157
Land and buildings	(1,942)	(599)	2	(2)	241	(2,300)
Other installations, plant, machinery, equipment & other	(617)	(173)	-	-	106	(684)
Depreciation and impairment	(2,559)	(772)	2	(2)	347	(2,984)
NET VALUE	4,051	(68)	2	3	185	4,173

⁽¹⁾Increases concern right-of-use assets recognised in respect of new leases.

⁽²⁾Other movements include the effect of contract revisions on right-of-use assets and translation differences.

10.4.2 Impacts in the income statement

The main impacts in the income statement of the Group's lease contracts as lessee are as follows:

(in millions of euros)	2023	2022
Income from subleases	7	7
Variable lease expenses	(74)	(53)
Expenses on short-term leases or leases of low-value assets	(140)	(108)
Income from sale and leaseback operations	-	-
Operating profit before depreciation and amortisation	(207)	(154)
Depreciation on right-of-use assets	(772)	(725)
Operating profit	(979)	(879)
Interest expense on the lease liability	(100)	(77)
INCOME BEFORE TAXES OF CONSOLIDATED COMPANIES	(1,079)	(956)

10.4.3 Payments relating to leases

(in millions of euros)	2023	2022
TOTAL PAYMENTS RELATING TO THE LEASE LIABILITY	(845)	(776)

Payments relating to the lease liability mainly concern principal repayments, and amount to €752 million in 2023 (€702 million in 2022).

10.5 Property, plant and equipment operated under concessions other than French public electricity distribution concessions

ACCOUNTING PRINCIPLES AND METHODS

The accounting treatment of concession agreements depends on the nature of the agreements and their specific contractual features.

CONCESSIONS IN FRANCE

In France, the Group is the operator for three types of concessions:

- public electricity distribution concessions granted by local authorities (municipalities or syndicated municipalities) (see note 11);
- hydropower concessions granted by the State;
- heat generation and distribution concessions from public authorities.

HYDROPOWER CONCESSIONS

Hydropower concessions follow standard rules approved by decree. For concessions granted before 1999, hydropower concession assets consist solely of hydropower generation equipment (dams, pipes, turbines, etc.), while for more recent concessions, they also include hydropower generation equipment and switching facilities (alternators, etc.).

Most concessions that expired before 2012 were initially for 75 years and were renewed for terms of 30 to 50 years. However, the French government has not yet renewed 31 concessions that have expired. Since their expiry these concessions have thus been in the "rolling extension" situation defined by the law, which stipulates that at the expiry date of a concession, if no new concession has been established "the concession is extended on the existing terms until such time as a new concession is granted", so as to ensure continuity of operations in the meantime (Article L. 521 - 16 par. 3 of the French Energy Code).

As these concession agreements are not concerned by IFRIC 12 "Service concession agreements", the assets used, whether directly owned or part of the concession, are recorded under "Property, plant and equipment operated under concessions other than French public electricity distribution concessions" at acquisition cost.

The main useful lives are the following; for concession assets, the depreciation periods also take account of the duration of the concession agreement:

- | | |
|---|----------|
| • Hydroelectric dams | 75 years |
| • Electromechanical equipment used in hydropower plants | 50 years |

HEAT GENERATION AND DISTRIBUTION CONCESSIONS FROM PUBLIC AUTHORITIES

Heat generation and distribution concession agreements signed by Dalkia with public authorities confer the right to operate facilities remitted by or constructed at the request of those authorities for a limited period, under the concession-granting authority's supervision.

These agreements set the terms for remuneration and transfer of the facilities to the concession-granting authority or another operator taking over at the end of the agreement.

The assets are recorded as "Other intangible assets", in accordance with IFRIC 12 "Service concession agreements". Intangible assets are depreciated on a straight-line basis over the term of the concession, which is generally between 15 and 25 years.

Almost all of these assets are located in France.

FOREIGN CONCESSIONS

Foreign concessions are governed by a range of contracts and national laws. Most assets operated under foreign concessions are recorded under "Property, plant and equipment operated under concessions other than French public electricity distribution concessions". Foreign concessions essentially concern Edison in Italy, which operates local gas distribution networks, hydropower generating plants and energy services under concessions. Edison owns all the assets except for some items of property, plant and equipment on the hydropower generation sites, which will be returned to the concession-granting authority for nil consideration or with an indemnity when the concession ends. In compliance with IFRIC 12, certain concession agreements are recorded as intangible assets.

Hydropower generation assets which will be returned for nil consideration at the end of the concession are depreciated over the duration of the concession.

The net values of property, plant and equipment operated under concessions other than French public electricity distribution concessions are as follows:

(in millions of euros)	31/12/2022	Increases	Decreases	Changes in the scope of consolidation	Other movements	31/12/2023
Land and buildings	1,649	31	(7)	-	1	1,674
Fossil-fired & hydropower plants	12,153	274	(24)	(507)	(6)	11,890
Other	686	38	(16)	-	(9)	699
Assets in progress ⁽¹⁾	685	104	(4)	(2)	9	792
Gross value	15,173	447	(51)	(509)	(5)	15,055
Land and buildings	(1,026)	(34)	6	1	(1)	(1,054)
Fossil-fired & hydropower plants	(6,816)	(336)	17	189	15	(6,931)
Other	(498)	(32)	17	-	4	(509)
Assets in progress ⁽¹⁾	(17)	(6)	-	-	6	(17)
Depreciation and impairment	(8,357)	(408)	40	190	24	(8,511)
NET VALUE	6,816	39	(11)	(319)	19	6,544

⁽¹⁾ Increases in assets in progress are stated net of the effects of newly-commissioned assets. Assets in progress are detailed in note 10.6.

At 31 December 2023, property, plant and equipment operated under concessions other than French public electricity distribution concessions comprise concession facilities mainly located in France and in Italy (hydropower, excluding public electricity distribution).

10.6 Assets in progress

(in millions of euros)	2023	2022
Intangible assets	2,600	2,110
Property, plant and equipment used in generation and other tangible assets	46,735	49,700
Property, plant and equipment operated under concessions other than French public electricity distribution concessions	775	668
TOTAL ASSETS IN PROGRESS	50,110	52,478

Intangible assets

At 31 December 2023, intangible assets in progress notably include studies for the EPR2 amounting to €1,569 million (€1,055 million at 31 December 2022). They also include investments of €254 million in the SMR (*small modular reactors*) project (€142 million at 31 December 2022).

New nuclear reactors in France: the EPR2 project

The EPR2 project concerns a new pressurised water nuclear reactor that meets the objectives for third-generation reactor safety, aiming to incorporate design, construction and commissioning experience acquired from EPR reactors and the nuclear reactors currently in operation.

On 16 July 2019, the ASN issued an opinion that the safety levels of EDF's key design options for its EPR2 were satisfactory. It stated that "the general safety objectives, the safety baseline requirements and the main design options are on the whole satisfactory".

The EPR2 will offer superior operating performance in terms of power (1650MW compared to 1450MW for the most powerful current reactor), output, availability and manoeuvrability.

On 10 February 2022, the French President announced the launch of a programme to construct 6 EPR2 reactors by 2035, and begin studies for an additional 8 EPR2 reactors by 2050. He also observed that it was necessary to aim to have the first new reactor commissioned by 2035, and said that these new EPR2 units will be built and operated by EDF.

While awaiting a decision on the EPR2, EDF was authorised by its Board of Directors on 31 March 2022 to continue development work until the end of 2023 with a budget extension of approximately €0.6 billion, bringing the total development budget for the EPR2 project to €1,805 million.

On 29 June 2023, EDF announced that it was making the applications for approval to launch construction of the first pair of EPR 2 reactors at Penly, and starting other administrative procedures required for their completion and connection to the electricity transmission network. EDF is proposing to build three pairs of EPR 2 reactors, at Penly (Normandy), Gravelines (Hauts de France) and Bugey (Auvergne Rhône-Alpes) (see the press release by the French President's Office of 19 July 2023).

Work on the competitiveness plan, the technical maturity review and programme consolidation is in process and should finish in 2024. The final conclusions of the State's financial audit will then be issued.

An appropriate plan for financing, and where relevant regulation, is currently being drafted for implementation of this programme. Revision of the completion cost for the project has begun and will continue during 2024. So far, no final investment decision has been made.

NUWARD, France's Small Modular Reactor (SMR) project

Development of the NUWARD SMR continued in 2023, with the end of the Conceptual Design phase, and the start in early April of the Basic Design phase which is due to be completed at the end of 2026. NUWARD SMR is a third-generation model pressurised water plant consisting of two 170MW units, designed to be built in large numbers and widely exported. Its main target is to provide a replacement for fossil-fired plants in the next few decades. Sales will be backed up by a model plant in France, due to start construction by 2030.

The design of the NUWARD SMR is being preassessed by the ASN in collaboration with the Czech and Finnish safety authorities SUJB and STUK. The purpose of this assessment, which will continue with the participation of more safety authorities (from Poland, Sweden and the Netherlands), is to accelerate the granting of international licences for SMRs while also giving a new impetus to regulatory harmonisation.

Another milestone in 2023 was the formation of the new subsidiary NUWARD, dedicated to development of the NUWARD SMR.

EDF received an initial €50 million subsidy from the French State in December 2022, granted under the "France 2030" plan. In June 2023, another subsidy of €300 million was attributed to finance the Basic Design phase, subject to European Commission approval which is expected to be given in 2024.

Property, plant and equipment used in generation and other tangible assets

At 31 December 2023, property, plant and equipment in progress used in generation and mainly comprise:

- investments for the **Flamanville 3** EPR amounting to €15,485 million, including capitalised interim interest of €3,471 million (€15,245 million at 31 December 2022, including capitalised interim interest of €3,471 million). The total amount capitalised for the Flamanville 3 project in the financial statements at 31 December 2023 is €15,703 million, which also includes €210 million⁽¹⁾ for assets that have been commissioned, of which €22 million is interim interest.

This capitalised amount of €15,703 million including capitalised interim interest, includes, in addition to the construction cost:

- an inventory of spare parts and capitalised amounts totalling €740 million for related projects (notably the initial comprehensive inspection and North Area development),
- €984 million of pre-operating expenses and other property, plant and equipment related to the Flamanville project,
- and the elimination of internal balances on balance sheet items and margins between Framatome and EDF SA in connection with the Flamanville 3 EPR project (€408 million, essentially consisting of advances and progress payments),

On 16 December 2022, EDF announced an adjustment to the schedule for the Flamanville 3 project, and the estimated cost to completion was raised from €12.7 billion to €13.2 billion in 2015 euros (see the Group press release of 16 December 2022)

The non-recurring additional costs resulting from the necessary repairs to the main secondary circuit welds and the costs of the associated stress-relieving heat treatment on the repaired welds (see the press release of 16 December 2022) are recorded in other income and expenses at the amount of €499 million in 2023 (€638 million in 2022) (see note 7).

(1) €346 million in gross value, less €136 million of depreciation.

- investments relating to **Hinkley Point C**, amounting to €27,425 million including capitalised interim interest of €1,682 million (€21,647 million at 31 December 2022 including capitalised interim interest of €1,110 million). Impairment totalling €11,702 million has been recorded against these assets (€11,151 million of this amount was recognised in 2023, see note 10.8). Investments in this project in 2023 amounted to €4,424 million (€3,890 million in 2022) excluding interim interest.
- studies concerning Sizewell C amounting to €1,483 million (€808 million in 2022).

The balance of property, plant and equipment in progress (excluding assets operated under concessions), i.e. €13,622 million, principally concerns EDF SA's existing nuclear plants (68%) in line with the *Grand Carénage* programme (replacement of major components, particularly steam generators; work in connection with periodic reviews and 10 - year inspections), and to a lesser extent (around 18%) EDF Renewables (power plants in development in Europe, North America and emerging countries).

Despite the higher investments during the year, amounting to €8,035 million (see note 10.3), property, plant and equipment in progress for generation decreased by €(2,965) million as a result of the €(11,151) million of impairment recognised for the HPC project in 2023.

Principal projects in progress and investments during the year

Investment programme for the existing nuclear fleet in France: *Grand Carénage*

Since 2014 EDF has been implementing its *Grand Carénage* industrial refurbishment programme for the French nuclear fleet, designed to enhance reactor safety and extend their operating lifetimes significantly beyond 40 years. On 31 March 2022, EDF's Board of Directors validated a new roadmap for the period 2022–2028, incorporating information gained from current ASN inspections, particularly the fourth 10-year inspections of 900MW and 130MW plants, and including the start of the research phase for the fifth 10-year inspections of 900MW plants, for an estimated total investment of €33 billion in current euros, i.e. €31.2 billion in 2021 euros. Investments made under the programme in 2023 totalled €4.4 billion.

Stress corrosion

In late 2021, during preventive maintenance checks on reactor 1 at the Civaux nuclear power plant, scheduled as part of its ten-year inspection, defects were detected close to welds on the pipes of the safety injection system (SIS) circuit. Preventive checks were then carried out on the Civaux 2, Chooz 1 and Chooz 2 reactors, which also belong to the N4 series, and similar defects were identified. Preventive maintenance checks conducted during the ten-year inspection of reactor 1 at the Penly nuclear power plant also found similar defects on the SIS circuit.

Through expert assessments and analyses conducted during 2022, EDF identified the reactors where the SIS circuit pipes are the most susceptible to stress corrosion. They are the 16 most recent reactors: the four N4- reactors, and twelve P'4 1300MW reactors.

The ASN declared its position on 26 July 2022 regarding EDF's proposed inspection strategy for the stress corrosion affecting its reactors. The ASN considered EDF's strategy appropriate given the knowledge learned about this phenomenon, and the related safety issues.

On 10 March 2023, following the results of an expert assessment of a weld at the Penly 1 reactor that was repaired twice during reactor construction, EDF sent the ASN a proposed update to its strategy aiming to accelerate the pace of inspections of welds repaired at the time of construction, which will take place during scheduled reactor outages for maintenance due to take place in 2023, 2024 and 2025.

In mid-March 2023 the ASN indicated that it had taken note of the updated strategy and would continue technical discussions with EDF to ensure that the intended timetable was appropriate⁽¹⁾. In a bulletin published on 25 April 2023, the ASN validated EDF's proposed timetable.

EDF has completed the planned 2023 programme of inspections of the repaired welds identified as high-priority because of the conditions in which they were repaired during construction, and has begun the 2024 programme validated by the ASN. These inspections will be carried out during maintenance outages that are already scheduled, and EDF does not expect any additional or ad hoc outages.

The welds on the N4 series have been repaired, and the N4 reactors were brought back online during the first half of 2023.

Preventive repairs have been completed at eleven of the twelve P'4 1300MW reactors (Penly 1, Penly 2, Cattenom 1, Cattenom 2, Cattenom 3, Golfech 1, Golfech 2, Belleville 1, Belleville 2, Nogent 1 et Nogent 2), and will be carried out on the last one (Cattenom 4) during the 10-year inspection scheduled for February 2024.

Repair work has also been completed at the P'4 1300MW reactors Penly 1, Penly 2, Cattenom 2, Cattenom 3, Golfech 1, Golfech 2 and Nogent 2. Repairs are in progress at Cattenom 1 and Belleville 2. Repairs are scheduled for the reactors at Belleville 1 and Nogent 1. For Cattenom 4, they will be undertaken during the reactor's 10-year inspection.

EDF's nuclear power output totalled 320.4TWh in 2023 with an increase of +42 TWh compared to 2022).

Flamanville 3 EPR project

In accordance with the schedule announced on 16 December 2022, EDF continued work in 2023 to complete the installation, and finalise preparations for fuel loading, which is due to take place in the first quarter of 2024. EDF expects to receive approval from the ASN for fuel loading during the first quarter of 2024.

Once the nuclear fuel is loaded in the reactor, start-up operations will continue, principally checks of all safety systems, equipment testing and qualification throughout the duration of the temperature and pressure increases in the nuclear steam supply system, and afterwards during the reactor ramp-up. On reaching 25% nominal power, the reactor will be connected to France's national grid.

The estimated cost to completion is unchanged at €13.2 billion⁽²⁾.

(1) See ASN press release of 16 March 2023

(2) In 2015 euros, excluding interim interest

Other developments on the Flamanville project in 2023 were as follows:

- The ASN and IRSN finalised their technical examination of the outstanding topics (SIS filtration function, pressuriser relief valves, etc).
- Work on the main secondary circuit welds was completed, with more than 120 welds repaired and 200 subjected to stress-relieving heat treatment. The ASN will issue its final opinion on the main secondary circuit's compliance in its Compliance Declaration for the nuclear steam supply systems.
- The "Overall Requalification Tests" on the plant were finalised on 10 December 2023: 4,000 pieces of equipment were verified.
- The ASN issued a decision on 16 May 2023 authorising use of Flamanville's current reactor vessel head until "the reactor shutdown during which the first complete requalification of the primary circuit takes place". As a result, the reference scenario for EDF now assumes that the vessel head will be replaced during the first scheduled shutdown for a full inspection, which should begin in mid-2025 at the end of the reactor's first operating cycle.

Following an ASN inspection in May 2023 in preparation for commissioning, the ASN is to conduct an additional inspection in February 2024 to verify implementation of the action set out in its follow-up letter published in July 2023.

Hinkley Point C

Following the final investment decision (FID) made by EDF's Board of Directors on 28 July 2016, EDF and China General Nuclear Power Corporation (CGN) signed contracts with the UK government for the construction and operation of two EPR reactors at the Hinkley Point site in Somerset (the "Hinkley Point C" or "HPC" project).

The Contract for Difference signed on 29 September 2016 aims to provide security in the revenues generated from electricity produced and sold by HPC over a period of 35 years from commissioning of Unit 2. From the plant's start date, if the reference price at which HPC sells electricity on the market is lower than the strike price defined in the contract, i.e. £92.50/MWh (in 2012 sterling), index-linked to UK inflation through the Consumer Price Index, HPC will receive an additional payment. If the reference price is higher than the strike price, HPC must pay the difference.

Over recent months, Hinkley Point C project has achieved a series of big milestones:

- On 15 December 2023, the dome was lifted and installed on Unit 1,
- The detailed design for the next phase of electromechanical (MEH) work was finalised,
- 70% of the equipment to be installed on Unit 1 has been delivered,
- The steam generators have been built and are ready for delivery,
- Testing of the UK instrumentation and control system is underway.

A review of the Hinkley Point C project has been finalised and has led to the following re-evaluation of the schedule and costs. The aim of the project is to bring Unit 1 into service around the end of the decade. Several scenarios have been analysed:

- The first scenario around which the project is organised is targeting becoming operational in 2029. This schedule is based on a target productivity for the electromechanical work, which action plans are being drawn up to achieve.
- A second scenario (base case), which assumes certain risks inherent in the ramp-up of the electromechanical work and the testing schedule do materialise, would see Unit 1 operational in 2030.
- Finally, given the complexity of the project, an unfavourable scenario assuming a further 12-month risk materialises could lead to Unit 1 being operational in 2031.

The costs of completing the project are now estimated at between £31 billion and £34 billion in 2015 values. The cost of civil engineering and the longer duration of the electromechanical phase (and its impact on other work) are the two main reasons for this cost revision. If the risk of an additional delay of 12 months mentioned above in the final scenario does materialise it would result in an estimated additional cost of around £1 billion in 2015 values.

As a reminder, the Group announced on 19 of May 2022 that the start of electricity production was scheduled for June 2027. At that time, the risk of further delay in the delivery of the two units was estimated at 15 months, and the cost of completion of the project at between £25 and £26 billion⁽¹⁾.

Based on these new fundamental assumptions and updates to other key assumptions, the Group recognised impairment of €(11,151) million on the HPC assets in progress at 31 December 2023 (see note 10.8).

Regarding funding of the project:

- the agreements signed by EDF Energy and CGN include a mechanism for coverage by EDF of certain additional costs in the event of initial budget overruns or delays. This mechanism was activated in January 2023 and led to EDF making a contribution of funding for the project that is recognised as an issue premium and has no impact on its ownership percentage. No further contribution is anticipated in view of current contract clauses;
- the shareholders' funding commitments have been fully honoured, and in accordance with the agreements, since the fourth quarter of 2023 construction of the project has been financed on a voluntary basis by the shareholders. Only EDF has provided additional equity.

At 31 December 2023, EDF's share in HPC is 67.7%, with CGN owning the remaining 32.3%.

(1) See the Group press release of 24 January 2024

Sizewell C

Sizewell C is a project to build a 3.26GW two-EPR nuclear power plant at Sizewell in Suffolk, England, to supply electricity for 6 million households for around 60 years. The project is founded on a strategy of replication of HPC, as far as possible copying the design of the HPC project and using the same suppliers. EDF will supply the Sizewell C project with the British EPR design, some of the key nuclear equipment via Framatome, the steam turbines (through EDF's future acquisition of GE Steam Power's nuclear activities), fuel assemblies for at least the first cycles, and related services.

The Sizewell C project was designated in November 2022 as eligible to benefit from the Regulated Asset Base (RAB) funding model.

On 29 November 2022, the UK government announced its decision to make a direct investment of about £700 million in Sizewell C, to support the project's ongoing development. In 2023, the UK Government committed to invest a further £511m to speed up preparations for construction. It gradually increased its shareholding during 2023 and is expected to continue to increase its investment in the project in 2024 until the Final Investment Decision.

At 31 December 2023, the UK government owned 50,6% of the project and EDF owned the other 49,4%. Sizewell C is still fully consolidated in the Group's accounts, despite the fact that it now holds only a minority stake, as EDF has retained its rights in key project decisions. This situation could change between now and the final investment decision as a result, for example, of modifications to the project's governance in 2024, the outcome of the current equity funding processes, offers received from investors, and Sizewell C's growing independence of EDF for completion of the project.

The project has transitioned, in 2023, from early works to delivery and is actively preparing the start of construction.

The financing terms of the construction are being discussed with the UK Government and the agreements are expected to be set out in 2024.

In September 2023, an equity raise process was therefore launched to seek additional funding from private investors for the construction of Sizewell C.

No later than the date of the FID, EDF plans to reduce its shareholding in Sizewell C to 19.99%, and to cease its control of the project.

Like other Group investments, EDF's commitment to contribute to the funding of the Sizewell C build at the Final Investment Decision date is subject to fulfilment of certain criteria selected by the Group.

At the date of this report, a Final Investment Decision (FID) is expected in 2024.

10.7 Investments in intangible assets and property, plant and equipment

The table below provides a breakdown of the investments in intangible assets and property, plant and equipment presented in the cash flow statement:

(in millions of euros)	2023	2022
Acquisitions of intangible assets	(2,183)	(1,720)
Acquisitions of property, plant and equipment	(19,667)	(16,923)
Change in payables to suppliers of fixed assets	829	319
INVESTMENTS IN INTANGIBLE ASSETS AND PROPERTY, PLANT AND EQUIPMENT	(21,021)	(18,324)

Investments in intangible assets and property, plant and equipment during 2023 mainly concern:

- the France – Generation and Supply segment: €6,584 million, primarily the investments in the nuclear fleet currently in operation, essentially made under the “Grand Carénage” programme and including €570 million for work to address the stress corrosion phenomenon, investments for the Flamanville 3 EPR, and investments in hydropower generation;
- the France – Regulated activities segment: €5,217 million, essentially investments related to connections for customers and producers, but also investments for network renewal and modernisation, and quality;
- the United Kingdom segment: €5,529 million, mainly concerning investments made for the Hinkley Point C project;
- the EDF Renewables segment: €2,124 million, mainly due to wind and solar capacities under construction, principally in North America, Brazil and the United Kingdom.

10.8 Impairment/reversals

ACCOUNTING PRINCIPLES AND METHODS

At the year-end and at each interim reporting date, in application of IAS 36, the Group assesses whether there is an indication that an asset could have been significantly impaired. An impairment test is also carried out at least once a year on cash-generating units (CGUs) or groups of CGUs including an intangible asset with an indefinite useful life, or to which goodwill has been partly or totally allocated.

Impairment tests are carried out as follows:

- the Group measures any long-term asset impairment by comparing the carrying value of these assets and goodwill, grouped into CGUs where necessary, and their recoverable amount;
- CGUs are groups of homogeneous assets that generate identifiable independent cash flows. They reflect the way activities are managed in the Group: they may be subgroups when the activity is optimised across the whole subgroup, or CGUs formed by parts of subgroups corresponding to different types of activity that are managed separately (thermal generation, renewable energy production, services), or single assets;
- the recoverable value of these CGUs is the higher of fair value net of disposal costs, and value in use. When this recoverable value is lower than the carrying amount in the balance sheet, an amount equal to the difference is booked under the heading "Impairment". The loss is allocated first to goodwill, and any surplus to the other assets of the CGU concerned; impairment booked on goodwill is irreversible;
- fair value is the asset's potential sale price in a normal transaction between economic actors;
- value in use is calculated based on projected future cash flows:
 - over a horizon that is coherent with the asset's useful life and/or operating life,
 - for certain intangible assets with an indefinite useful life (such as brands), beyond the horizon that can be observed or modelled, a terminal value is determined by discounting to infinity a normative cash flow,
 - excluding development projects other than those that have been decided at the valuation date, and
 - discounted at a rate that reflects the risk profile of the asset or CGU;
- the discount rates used are based on the weighted average cost of capital (WACC) for each asset or group of assets concerned, determined by geographical area and by business segment under the CAPM. WACC is calculated after taxes;
- future cash flows are calculated on the basis of the best available information at the closing date:
 - for the first few years, the flows correspond to the budget, then the Medium-Term Plan (MTP). Over this horizon, energy and commodity prices are determined based on available forward prices, taking hedges into consideration,
 - beyond the MTP horizon, cash flows are estimated based on long-term assumptions prepared for each country where the Group controls industrial assets, using a financial trajectory and scenario-building process that is updated annually. Long-term electricity prices are constructed analytically based on a set of assumptions concerning factors such as economic growth, commodity (oil, gas, coal) and CO₂ prices, demand for electricity, interconnections, changes in the energy mix (rise of renewable energies, installed nuclear capacity, etc.) and fundamental models of supply-demand balance. The Group compares each principal component of assumptions with analyses by external bodies (for example, for commodities and CO₂, which are primary influences on electricity prices). The scenarios used also based on the objectives of public energy and climate policies such as Fit For 55 and RepowerEU at European Union level, and the National Low Carbon Strategy (*Stratégie Nationale Bas Carbone*) in France, and the Group compares its own scenarios with scenarios developed by organisations such as the IEA, IHS, Wood Mackenzie or Aurora, bearing in mind that each of these analysts itself proposes a cone of scenarios. Additionally, in constructing these long-term prices, the impact of climate contingencies is incorporated into assumptions concerning demand (particularly energy requirements for heating, and summer comfort), generation of renewable energies (onshore and offshore wind power, solar power) for all European countries, the contribution of hydropower, and environmental cuts for nuclear power generation in France. Climate time series analyses are based on the European EUROCORDERX model and include the impact of climate change. A deliberately prudent approach is adopted to avoid any bias towards underestimation of the practical effects of climate change on the relevant physical quantities as such as temperatures, cloud coverage or wind speeds and ultimately on the European electricity system between 2028 and 2050;
- income from capacity market mechanisms is also taken into consideration in valuing generation assets, provided the countries concerned have introduced or announced the future introduction of a capacity revenue mechanism.

These calculations may be influenced by several variables:

- changes in discount rates;
- changes in market prices for energy and commodities and tariff regulations;
- changes in demand and the Group's market shares, and the attrition rate on customer portfolios;
- the useful life of facilities, or the duration of concession agreements where relevant;
- the growth rates used beyond the medium-term plans and where relevant the terminal values taken into consideration.

10.8.1 Impairment by category of asset

Details of impairment recognised and reversed are as follows:

(in millions of euros)	Notes	2023	2022
Impairment of goodwill	10.1	(1,779)	(1,178)
Impairment of other intangible assets	10.2	(44)	(65)
Impairment of tangible assets	10.3-10.5	(11,188)	(519)
IMPAIRMENT NET OF REVERSALS		(13,011)	(1,762)

Impairment recognised in 2023 amounts to €(13,011) million. Details are given below.

As a reminder, impairment recognised in 2022 amounted to €(1,762) million and concerned:

- the goodwill of EDF Energy (€(1,176) million);
- nuclear power plants in operation and under construction in the United Kingdom (€(271) million);
- wind farms and various CGUs of EDF Renewables, principally in the United States and Mexico (€(129) million);
- Energy Service assets and goodwill in Italy (€(68) million);
- and other assets (total impairment €(118) million).

10.8.2 Impairment tests on goodwill, intangible assets and property, plant and equipment

The following tables present the results of impairment tests carried out on the main goodwill, intangible assets with indefinite useful lives and other Group assets at 31 December 2023, and some of the key assumptions used.

Impairment of goodwill and intangible assets with indefinite useful lives

€(1,779) million of new impairment was recorded on the Group's goodwill at 31 December 2023.

Operating segment	Cash-Generating Unit or asset	Net book value (in millions of euros)	WACC after tax	Growth rate to infinity	Impairment recognised in 2023 (in millions of euros)
United Kingdom (EDF Energy) ⁽¹⁾	Goodwill	4,901	6.9%	-	(1,773)
	Including Pod Point	37			(35)
Italy (Edison)	Goodwill (energy services)	150	<8.2% - 9.2%>	1.5%	(4)
	Edison brand	945			-
Framatome	Goodwill	1,475	7.7%	1.5%	-
	Framatome brand	151			-
Dalkia	Goodwill	626	6.0%	2.0%	-
	Dalkia brand	130			-
Other impairment		-	-	-	(2)
IMPAIRMENT OF GOODWILL AND INTANGIBLE ASSETS WITH INDEFINITE USEFUL LIVES					(1,779)

⁽¹⁾The impairment test of EDF Energy goodwill covers the useful life of industrial assets, currently in operation or under construction, with no projection to infinity. The WACC determined for goodwill takes account of the WACC applicable to each of EDF Energy's CGUs, including the WACC applicable to the HPC CGU, which benefits from a regulated model.

Impairment of other intangible assets and property, plant and equipment

Impairment of €(11,232) million was recorded in respect of other intangible assets and property, plant and equipment at 31 December 2023.

				Impairment recognised in 2023
Operating segment	Cash-Generating Unit or concerned asset	Impairment indicators	WACC after tax	(in millions of euros)
United Kingdom (EDF Energy)	Nuclear assets currently under construction	Adjustment of Hinkley Point (HPC) project schedule and costs	6.8%	(11,151)
	Other assets	Higher prospects for appreciation of value		53
EDF Renewables	Wind power and solar assets	USA, France: lower profitability on projects in development / non- renewal of PPAs	From 5.7% to 6.4%	(50)
	Other	China : subsidies not received		(34)
Other impairment				(50)
IMPAIRMENT OF OTHER INTANGIBLE ASSETS AND PROPERTY, PLANT AND EQUIPMENT				(11,232)

€(240) million of impairment net of reversals was also recognised in respect of associates at 31 December 2023. This impairment mainly concerned assets owned by EDF Renewables (see note 12.3). Impairment of associates totalling €(141) million was recognised at 31 December 2022.

General assumptions

At 31 December 2023, the Group applied its usual method for impairment testing, updating the annual tests for goodwill and intangible assets.

As in 2022, particular attention was paid to the determination of WACC in an environment of rising and volatile interest rates (see the section on the Discount rates), given the sensitivity of certain tests to variations in this parameter. For both impairment and sensitivity tests, the effects of scenarios concerning prices and measures announced or introduced by the authorities in countries where the Group does business were subjected to specific monitoring.

Electricity prices

Over the market horizon (generally three years), the forward prices used in the impairment tests concerning all geographical areas are the market prices observed at 31 December, including hedged positions. The assumptions used thus take account of the current market environment, in which forward electricity prices have decreased significantly compared to the 2022 year-end, partly due to relatively lower pressure on gas prices, and better nuclear fleet availability.

Over the long-term horizon, these tests use analytically constructed price curves founded on assumptions and fundamental models of the supply-demand balance, in an annually updated scenario-building process that is subject to specific internal governance.

The scenarios used are closely linked to the objectives of public energy and climate policies in the various countries where the Group has operations. In particular, they include high CO₂ prices supporting the move to carbon-free electricity generation in Europe, and more generally to a carbon-free economy through electrification of uses. For example, the CO₂ price scenario at 31 December 2023 is €130/t for 2030, €165/t for 2040, and €200/t in 2050 (all expressed in 2022 euros).

The long-term price curves (from 2028 onwards) in the 2023 scenario are higher than the 2022 scenario in the early part of the horizon. An increase of approximately +€5/MWh (in 2022 euros) is observed in the average baseload power price in the four core countries (France, the United Kingdom, Italy and Belgium).

This development is explained by several factors:

- to reflect the reinforcement in European ambitions for decarbonisation and cutting greenhouse gas emissions, CO₂ quota prices follow a rising trajectory and are higher than in 2022 over the horizon 2028-2050. At the start of the horizon, the impact of CO₂ prices on electricity price levels is very important. Regarding sensitivity to this parameter, it should be noted that from 2028, a +/-€1/t variation in CO₂ prices would result in a change of approximately +/-€0.4/MWh in electricity prices in France, an effect that would gradually recede as electricity generation becomes increasingly decarbonised;
- pressures on gas supplies following the Russian invasion of Ukraine were partly relieved through diversified sourcing (notably LNG), and the option of joint purchasing contracts with EU member states, providing access to larger volumes. Consequently, the scenario includes more relaxed gas prices, with relatively lower trajectories than in 2022, although they remain similar over the long term;
- at the end of the horizon, the increase in CO₂ prices combines with accelerated development of low-carbon generation facilities (nuclear power and renewable energy) to result in relatively stable electricity prices compared to the projections in the 2022 scenarios.

Demand for electricity is rising across all timescales in Europe due to the electrification of uses, particularly in transport and industry, reinforced by a greater need for electrolytic hydrogen. These developments, in addition to the RePowerEU plan to accelerate energy independence in Europe, have driven a rise in requirements for electricity.

As these assumptions are key for the determination of the recoverable value of the Group's assets, sensitivity analyses are carried out on long-term price curves as part of the impairment tests.

Discount rates

The discount rates used in impairment testing were revised upwards for 2023 in all Euro zone countries. In the United Kingdom, the increase was moderate, since the specific situation of UK sovereign rates had already been taken into account at 31 December 2022.

This revision is due in general to upward trends in risk-free rates (despite a stabilisation observed at the end of the year), partly offset by a readjustment of the equity market risk premium in a total return approach. The EDF spread was also adjusted upwards.

The increase since 2022 in the principal WACCs used in impairment tests was thus 70-80 base points for France and Belgium, and 110 base points for Italy.

The impairment test results are analysed for sensitivity to the discount rate (+/-30bp and +/-50bp). With the exception of the United Kingdom zone, which is sensitive to any new increase, these tests did not indicate any risk of impairment on the Group's other geographical zones.

United Kingdom – EDF Energy (Goodwill and tangible and intangible assets: €26,494 million – see note 4.1.1)

Thermal assets

Following closure of both Cottam and West Burton A power plants, both continue to undergo decommissioning work.

As the result of a strategic decision made in late 2023, the gas storage business was classified (and recognised in the financial statements) as an asset held for sale.

The net book value of the remaining assets is close to nil.

Sales and Supply segment

The Sales and Supply operating segment was affected by the UK's energy market crisis in 2022, but 2023 saw the return to a more favourable situation thanks to a good sales performance in the medium and large BtoB segments, which helped to strengthen margins and market share. The restoration of margins in the BtoC segment was also supported by a tariff effect that allowed suppliers to recuperate some of the costs incurred at the height of the energy crisis.

Prices nonetheless remained high in the United Kingdom, eroding demand. Market shares remained stable, with a low attrition rate compared to 2022. The taxation mechanisms applicable to energy producers (to protect consumers) continued in 2023 and will remain in force until 2028.

The recoverable value of the Sales and Supply segment is lower than in 2022: this is principally due to the passage-of-time effect as 2023 was a year of substantial cash inflows corresponding to past losses, and an exceptional gain on optimisation of nuclear power generation. These one-off effects were partly counterbalanced by a 50bp improvement in margins in the BtoC segment, over the whole duration of the test, reflecting the regulator's stance on guaranteeing sustainable performance in the energy market. The Sales and Supply segment remains relatively insensitive to price scenarios as wholesale energy costs are generally passed on to consumers over time.

Sensitivity analysis:

Sensitivity tests were conducted, based on major reductions in long-term margin rates and losses of market share in both segments. These tests did not identify any risk of impairment for this operating segment, which has few fixed assets (mainly information systems).

Nuclear assets (plants in operation)

The recoverable value of EDF Energy's nuclear assets in operation is determined by discounting future cash flows over the assets' useful life. At 31 December 2023, this operating segment is comprised of Sizewell B PWR plant, assuming that it will remain in operation until 2055, Torness and Heysham 2 AGR plants until March 2028, and Hartlepool and Heysham 1 AGR plants, where the end of operations has been extended by two years to March 2026 (see the EDF Energy press release of 9 March 2023).

The short term forward market prices have decreased since the 2022 impairment review. This decrease is partly mitigated by the effect on the Electricity Generator Levy on low-carbon electricity producers (45% on revenues above £75/MWh between January 2023 and March 2028). In addition to this unfavourable effect, the discount rate has increased from 6.9% to 7.7%, partly offset by an increase in long-term prices and the favourable impact of the 2-year extension to the operating lifetimes of Hartlepool and Heysham 1. The test result showed a small decline in the headroom, which remains high.

Sensitivity analysis:

Sensitivity tests were conducted on the assumptions to which this operating segment is particularly sensitive, i.e. a -5% downturn in electricity prices or nuclear power output across the whole horizon or a 50bp increase in the discount rate. These sensitivities are not likely to generate any risk of impairment, individually or in combination, all other things being equal.

Goodwill and the HPC Project

EDF Energy's gross goodwill amounted to €7.8 billion including Pod Point (or £6.8 billion including Pod Point) at 31 December 2023 and mainly results from the takeover of British Energy in 2009. At 31 December 2022, the updated impairment test led to recognition of partial impairment amounting to €(1.2) billion.

On 23 January 2024, the Group announced that the schedule and cost for construction of the two nuclear reactors at Hinkley Point C had been revised, to update assumptions regarding the cost of civil engineering work and extension of the electromechanical work (MEH) phase, and the resulting consequences for the other islands. Three scenarios have been analysed (see the Group press release of 23 January 2024, and note 10.6). The completion cost for the project is estimated at £31-34 billion⁽¹⁾ (in 2015 sterling), including the risk of a one-year deferral with an estimated cost of approximately £1 billion (in 2015 sterling), as opposed to the previous estimate of £25-26 billion (in 2015 sterling).

An unfavourable scenario assuming a further 12-month risk materialises could lead to an additional delay of 12 months and would result in an estimated additional cost of around £1 billion in 2015 values.

Scenarios were weighted for the test, such that they converge towards the baseline scenario which assumes that electricity generation by HPC Unit 1 will now start in 2030 instead of June 2027 as previously (and 2031 in the case of Unit 2 instead of June 2028 previously). This scenario incorporates the risk of an additional one-year deferral compared to the 120-month timetable scenario used for organisation and management of the project.

The recoverable value of EDF Energy is determined by discounting future cash flows over the assets' useful life, taking into consideration the two reactors with a 60-year operating lifetime currently under construction at the Hinkley Point site. Future cash flows from these plants are determined by reference to the Contract for Difference (CfD) between the Group and the UK government. The CfD sets stable, predictable prices for EDF Energy for an initial period of 35 years from the date the two EPRs are first commissioned (this duration has been shortened by around 18 months due to the revised schedule): if market prices fall below the CfD exercise price, EDF Energy will receive an additional payment. The CfD exercise price for HPC is set at £92.50/MWh (in 2012 sterling) and is indexed on UK inflation via the consumer price index (CPI) (£126/MWh in current sterling based on inflation rates available at 31 March 2023). Thus, for the operation period under the CfD, future cash flows include a long-term inflation assumption (initially 2.2%, then an average of 2.1% from 2050). For the 25 years of operation after the CfD period, for which no forecasts exist for long-term UK electricity market prices, future cash flows include a very long-term inflation assumption of 2.10% and a price assumption based on the CfD exercise price of £92.50/MWh (in 2012 sterling), which is the best estimate of market price levels over this horizon in the absence of corresponding price scenarios.

The WACC determined for HPC is a hybrid rate that reflects the specificity of the cash flows being first regulated by the CfD, then exposed to market prices in subsequent years. The rate applicable to the project is 6.8% at 31 December 2023, 10bp higher than the 6.7% used in 2022. The WACC used to test EDF Energy goodwill takes account of the WACC applicable to each of the company's parts of the business (HPC, Nuclear assets (plants in operation), Sales and Supply). Given the respective importance of cash flows from each CGU, the overall WACC for EDF Energy goodwill is 6.9% at 31 December 2023, compared to 6.7% at 31 December 2022.

Based on these new fundamental assumptions and updates to other key assumptions such as the 10bp increase in WACC and the most recent foreign exchange and inflation data, the impairment test of the HPC project at 31 December 2023 identified impairment of €(11,151) million at that date. This impairment is reversible if there is evidence of a significant recovery in the value of the asset, other than the effect of the passage of time on discounted cash flows.

Regarding the value of EDF Energy's goodwill, although EDF Energy's other parts of the business (Nuclear plants in operation, Sales and Supply) still show substantial headroom, it was lower than the previous year due to a market environment that was less favourable to their business. These effects therefore led to recognition of partial additional impairment of €(1,738) million on EDF Energy's goodwill at 31 December 2023. This impairment is irreversible by nature.

Sensitivity analysis:

The book value of the HPC project, like the book value of EDF Energy's goodwill, remains sensitive to any unfavourable variation in assumptions.

A 30bp increase in discount rates would have a negative impact of £(2) billion on recoverable value, while an equivalent decrease would have a favourable impact of £2.3 billion.

A 20bp decrease in inflation rates after 2030 would have a negative impact of £(1.2) billion on recoverable value, while an equivalent increase would have a favourable impact of £1.3 billion.

Other assets in the new nuclear category

Capitalised costs for the Sizewell C project (note 10.6) amount to €1,483 million and are included at net book value in the impairment test of EDF Energy's goodwill, without considering their prospects for appreciation in value, notably in view of the Regulated Asset Base (RAB) funding model.

(1) £41.6-46.5 billion in current currency based on inflation rates available at 30 June 2023.

Italy – Edison (Goodwill and tangible and intangible assets: €5,871 million – see note 4.1.1)

As an intangible asset with an indefinite useful life, the impairment test of the Edison brand, first recognised at the value of €945 million when Edison was taken over in 2012, is updated annually using the royalty relief method and a 100bp risk premium in determining the discount rate. The test was updated at 31 December 2023, and showed that there had been a decrease in the brand's recoverable value, principally as a result of a further increase of more than 100bp in the WACC, and downward revision of short-term price scenarios.

Sensitivity analysis:

Sensitivity tests based on an additional 50bp increase in the WACC, and a -5% decrease in royalties, did not indicate any risk of impairment.

The same trend is observed in Edison's other generation CGUs (Thermal assets, Wind power, Solar power, Gas).

For the Thermal assets CGU, the headroom indicated by the impairment test remains clearly positive despite the unfavourable impact of a narrowing of clean spark spreads in the short and medium term, and the higher discount rate. This headroom essentially relates to the two new-generation CCGT plants at Marghera and Presenzano (carbon emissions 40% below the national average, NOx emissions reduced by 70%) which will benefit from capacity revenue and commissioned in 2023.

For the Hydropower CGU, the recoverable value increased as future cash flows include an improvement in post- Medium term Plan price scenarios, notably due to discontinuation of the windfall tax in 2024. No risk of impairment was therefore observed for this CGU.

Sensitivity analysis:

Sensitivity tests based on an additional 50bp increase in the WACC, and a 10% decrease in clean spark spreads would not affect the test conclusions.

Framatome (Goodwill and tangible and intangible assets: €4,428 million – see note 4.1.1)

The recoverable value of Framatome is determined on the basis of a 10 - year business plan and a terminal value. This business plan is sensitive to assumptions concerning the completion of major construction projects that are incorporated into the reactor scenario, market share assumptions concerning services to the installed base, and assumptions concerning fuel deliveries to customers' reactors. The baseline scenario includes expansion of the EPR2 programme in France and realisation of the Sizewell C project in the United Kingdom, but does not include realisation of other EPR projects, particularly in India and the Czech Republic.

The long-term growth rate used in impairment testing was stable (at 1.5%).

The WACC used to discount future cash flows is weighted according to Framatome's different businesses and their risk profiles. The headroom indicated by the impairment test on goodwill (amounting €1,475 million) remains very significant although lower than at 31 December 2022, principally due to the increase of over 70bp in the WACC (from 7% to 7.7%).

Framatome's intangible assets recognised at the time of its acquisition (technologies, including the EPR, which are depreciated over an average 15 to 20 years; customer relations amortised over an average period of 11 years; and the brand) were tested, and no risk of impairment was identified.

Sensitivity analysis:

Sensitivity tests based on a 50bp increase in discount rates or a 50bp decrease in growth rate to infinity did not indicate any risk of impairment.

EDF Renewables (Goodwill and tangible and intangible assets: €13,257 million – see note 4.1.1)

EDF Renewables' assets mainly consist of CGUs that benefit from Power Purchase Agreements (PPAs) providing contractually defined revenues over most of the assets' useful lives, and consequently have low market risk exposure.

Impairment tests conducted at 30 June 2023 led to recognition of €(34) million of impairment concerning two wind farms in China commissioned in 2021, for which the confirmed risk of non-reception of subsidies had a substantial impact on the projects' profitability.

During the second half of 2023, other impairment totalling €(50) million was identified on specific assets in France and the United States, mainly concerning wind farms in development for which future profitability was assessed as insufficient.

€(54) million of impairment of associates (see note 12.3) was also recognised on the Neart na Gaoithe (NnG) wind farm off the shore of Scotland due to the risk of delays of commissioning and the increase of over 100bp in the discount rate.

Dalkia (Goodwill and tangible and intangible assets: €3,055 million – see note 4.1.1)

At 31 December 2023, Dalkia's goodwill amounts to €626 million, principally resulting from acquisition of the Dalkia group in France in 2014.

The recoverable value of Dalkia is based on future cash flows projected over a medium-term horizon, and a terminal value that represents cash flow projections to infinity. The test update at 31 December 2023 found that the recoverable value had decreased, principally due to the 80bp increase in the WACC (from 5.2% to 6%), which was partly mitigated by an increase in the long-term growth rate (to 2%) in line with inflation. The headroom for this operating segment nonetheless remains positive.

The Dalkia brand, which was recognised as an asset when the Group took control of Dalkia in 2014 at the value of €130 million, is valued by the royalty relief method. The updated impairment test at 31 December 2023 did not call into question the value recorded in the financial statements.

Sensitivity analysis:

Sensitivity tests based on an additional 50bp increase in the WACC, and a 20bp decrease in the growth rate to infinity, did not indicate any risk of impairment.

France – Generation and Supply (Goodwill and tangible and intangible assets: €64,629 million – see note 4.1.1)

In terms of asset value, this segment consists almost entirely of the generation fleet in mainland France. Due to the integrated management and interdependence of the different generation facilities that make up the French fleet (nuclear, thermal and hydropower plants), independently of their maximum technical capacities, the Group considers the entire fleet as a single CGU. It includes the Flamanville 3 plant, with net book value of €15,703 million (see note 10.6). It does not include any goodwill.

No indication of impairment was identified in 2023 for the CGU consisting of the French generation fleet.

However, in view of the rise in discount rates, the variations in electricity prices and the announcement of post-ARENH mechanisms in the electricity market, the recoverable value was updated.

The recoverable value is estimated by discounting future cash flows by the Group's usual methodology, described in the accounting policies, over the assets' useful life, using an after-tax WACC of 7% at 31 December 2023 (up by 70bp from the 6.3% at 31 December 2022). For nuclear assets, the Group's benchmark model assumes an operating lifetime of 50 years for 900MW and 1300MW-series plants and 40 years for N4-series plants, consistent with the depreciation periods used in the consolidated financial statements at 31 December 2023, although it is the Group's strategy to keep plants in operation well beyond 50 years. The recoverable value also incorporates the most recent assumptions concerning Flamanville 3 (which will have a 60-year operating lifetime, see note 10.6).

For the period 2024 - 2025, the key assumptions concerning price and regulation take account of forward prices (significantly lower over this horizon than at the 2022 year-end) and hedges already contractualised, an ARENH volume of 100TWh and price of €42/MWh, a tariff cap for final consumers that will be funded by the French State budget in accordance with the current Finance Law, and the best estimate of the inframarginal rent cap, considering the loss reported for 2022 (see note 5.4). These assumptions are consistent with the 2024 budget approved by the Board of Directors.

France's proposed law on national energy sovereignty⁽¹⁾ plans to introduce a new mechanism to replace the ARENH (Regulated access to historic nuclear power) scheme from 1 January 2026. Under these proposals EDF would pay a contribution consisting of a share of the nuclear plants' net energy revenues above certain thresholds, for redistribution to consumers.

At the press conference held on 14 November 2023 by France's Finance Minister Bruno Le Maire and Energy Transition Minister Agnès Pannier-Runacher, and in the document for the public consultation launched on 23 November 2023 concerning the future consumer protection mechanism, the following thresholds were stated: above €78-80/MWh and €110/MWh (both in 2022 euros), 50% and 90% respectively of revenues from nuclear generation would be payable to the State. This information was taken into account as key assumptions in estimating recoverable value at 31 December 2023.

The new market organisation aims to develop medium and long-term products in addition to the short-term products and renewable energy PPAs currently available on the wholesale electricity markets: - medium-term 4 or 5-year annual baseload supply contracts - allowing EDF and all electricity suppliers in France to offer supply contracts that provide customers with visibility and stability over horizons of up to 5 years.

EDF also offers certain electro-intensive customers long-term industrial partnership contracts relating to the historic nuclear fleet (Nuclear Generation Allocation Contracts).

The recoverable value resulting from the test decreases but remains well above the net book value. The key assumptions in the test still concern:

- the operating lifetimes of nuclear assets;
- the long-term market price scenario (after the end of the ARENH scheme) and to a lesser degree the changes in forward prices over the medium-term horizon;
- the volume of nuclear power output;
- the discount rate; and
- to a lesser extent, changes in costs and investments, and the assumed capacity revenue.

Sensitivity analysis:

These key assumptions were subjected to individual sensitivity analyses (a 50bp increase in the WACC; a 10TWh annual decrease in nuclear power output over the whole period; an increase in investments or operating expenses; a decline in capacity prices; and post-2026 market prices 10% below the baseline scenario price for a sustained period) and the results did not call into question the existence of a positive difference between the book value and the recoverable value.

For example, a decrease of 10TWh a year over the whole generation period would have a negative impact of €(14.5) billion on recoverable value.

A 50bp increase in the discount rate would have a negative impact of €(4.3) billion on the recoverable value.

A +10% increase in investments over the whole period, would have a negative impact (4) billion on the recoverable value.

(1) Proposed law on France's energy sovereignty as submitted to the National Ecological Transition Council in a rectified referral of 17 January 2024.

Other International – Belgium (Goodwill and tangible and intangible assets of the whole Other International segment: €2,546 million – see note 4.1.1)

The impairment test update for Luminus confirmed the substantial headroom in this operating segment. The headroom was bigger than in 2022, mainly driven by the favourable effect of the passage of time (large cash outflows in the year 2023 which was penalised by windfall taxes, the investments in the new thermal CCGT plant at Seraing, and the costs of the three-year review of nuclear provisions) and the update of price assumptions for a commissioning date expected in 2025, which will benefit from capacity revenue. This improvement was slightly counterbalanced by the 80bp increase in the WACC (from 6.4% to 7.2%).

Impairment tests of the nuclear plants operated by the Engie Group in which Luminus owns a 10.2% share (419MW) now take account of the possible 10-year extension for the Doel 4 and Tihange 3 reactors, following the final agreement signed by Engie and the Belgian government on 13 December 2023.

following the agreement in principle between the Belgian government and Engie announced on 13 December 2023.

Sensitivity analysis:

The sensitivity tests conducted based on an additional 50bp increase in the WACC, or the risk that hydropower concessions may be shortened, did not show any risk of impairment.

Note 11 French public electricity distribution concessions

ACCOUNTING PRINCIPLES AND METHODS

The accounting treatment of public distribution electricity concessions in France is determined by the concession agreements, with particular reference to their special clauses. It takes into consideration the possibility that the EDF group, particularly Enedis, may one day lose its status as the sole authorised State concession operator.

In application of the concession agreements, the concession operator manages the facilities at its own risk for the entire term of the concession, and bears substantially all the risks and benefits (both technical and economic) over the useful life of the network infrastructure. Under IAS 16, the assets are controlled by the operator and the grantors have no decisive characteristics of control over the infrastructures as defined by IFRIC 12.

All concession assets are consequently carried in the balance sheet, regardless of their origin (facilities constructed or purchased by the concession operators, and facilities provided by the concession grantors) and the source of financing, while the contractual obligations to the grantor are recognised in the liabilities.

Public electricity distribution facilities that are constructed or purchased by the concession operator are carried at production or acquisition cost:

- purchased facilities are initially recognised at acquisition cost including directly attributable expenses incurred to make the asset ready for use;
- the production cost of facilities developed in-house includes all labour and materials costs, and all other production costs attributable to the construction of the asset, whether incurred directly by the company or invoiced by third parties.

New facilities provided by the concession grantors are carried at the value of the cost the Group would have borne if it had constructed them itself.

In the specific case of rising mains transferred for no consideration to the public distribution network in application of article 176 of French law 2018 - 1021 of 2 November 2018 on housing, development and digital affairs (the “ELAN” law), these assets are carried at their market value under article 213 of France’s national chart of accounts.

Balance sheet liabilities are recognised in respect of new facilities provided for no consideration by the concession grantors and the rising mains transferred under the ELAN law are included in “Special French public electricity distribution concession liabilities” in the balance sheet liabilities.

Distribution assets (pipes, substations, connections) are depreciated over periods of 30 to 60 years, meters and metering equipment over periods of 20 to 30 years. The Group regularly checks the relevance of the main accounting parameters for concession assets (depreciation periods, replacement values, management levels).

Regulations governing distribution concessions in France

Since the enactment of the French Law of 8 April 1946, EDF, and subsequently Enedis, has been the concession operator of most of the public distribution networks in France.

SEI is the concession operator for distribution network zones that are not interconnected with the network in mainland France, under identical concession regulations to Enedis.

Electricité de Strasbourg is the concession operator for public distribution networks in a limited zone depending on a non-nationalised distributor, in application of the Law of 8 April 1946.

In accordance with France’s Energy Code and Local Authorities Code, the public distribution of electricity is principally operated under the public service concessions system. The authorities granting the concessions (local authorities or public establishments for cooperation invested with the relevant competence) organise the public electricity distribution service through concession agreements with specifications that define the respective rights and obligations of the parties. Enedis distributes electricity to 95% of the population of mainland France under such concessions, with 376 concession agreements at 31 December 2023. The other 5% are served by Local Distribution Companies (including Electricité de Strasbourg).

2017 concession agreement model

On 21 December 2017, the FNCCR, France Urbaine, EDF and Enedis signed a framework agreement for a new concession agreement model. This new model modernises the relationship between Enedis and concession-granting authorities in the long term and reflects the parties' attachment to the principles of French concessions for electricity distribution: public service, regional solidarity and national optimisation. The FNCCR and France Urbaine represent the concession-granting authorities, particularly towns, syndicated municipalities, boroughs and major cities when they are the authorities with competence to grant public electricity distribution concessions.

At the effective date of a new agreement, the existing special concession liabilities recorded in application of the previous concession agreement (corresponding to the 1992 model) to represent the concession-granting authority's rights in the concession assets remain in the accounts. Like earlier concession agreements signed since 2011, the contractual obligation to establish provisions for replacement no longer exists, and the governance of investments is different.

To provide an effective public service, the distribution network operator and the concession-granting authority now agree to jointly set up a governance system to oversee investments in the public electricity distribution network over the area covered by the concession, including replacement of infrastructures. This system mainly takes the form of a master plan taking a long-term view of developments in the network over the concession area, and multi-year investment plans (programmes pluriannuels d'investissements - PPIs) for 4 and 5-year periods that are medium-term applications of the master plan.

PPIs contain detailed objectives for each investment purpose, concerning a selection of quantified, localised investments with financial valuations for the duration of the plan.

PPIs are revised when necessary, after consulting with Enedis and the authority granting the concession, to take account of changes in each party's investment priorities and financial resources.

If it were observed at the end of a PPI that any investment concerned by Enedis' financial commitment had not been made, the concession-granting authority could oblige Enedis to deposit a sum equal to 7% of the investments still to be made. This deposit would then be returned or retained after a two-year period, depending on the investments made by that time.

11.1 Property, plant and equipment operated under French public electricity distribution concessions

(in millions of euros)	31/12/2022	Increases ⁽¹⁾	Decreases	Other movements ⁽²⁾	31/12/2023
Land and buildings	3,517	152	(24)	(1)	3,644
Networks	108,544	4,399	(482)	2	112,463
Other installations, plant, machinery, equipment & other	5,023	508	(276)	(1)	5,254
Assets in progress ⁽³⁾	2,204	511	(14)	(3)	2,698
Gross value	119,288	5,570	(796)	(3)	124,059
Land and buildings	(1,730)	(88)	23	(8)	(1,803)
Networks	(50,490)	(188)	322	(2,504)	(52,860)
Other installations, plant, machinery, equipment & other	(3,102)	(300)	274	(140)	(3,268)
Depreciation and impairment	(55,322)	(576)	619	(2,652)	(57,931)
NET VALUE	63,966	4,994	(177)	(2,655)	66,128

⁽¹⁾ Increases also include facilities provided by the concession-granting authorities.

⁽²⁾ Other movements mainly concern depreciation of assets operated under concessions, booked against a reversal in the special concession liability accounts.

⁽³⁾ Increases in assets in progress are stated net of the effects of newly-commissioned assets.

11.2 Special French public electricity distribution concession liabilities

ACCOUNTING PRINCIPLES AND METHODS

Concession liabilities represent the contractual obligations specific to the concession rules for public electricity distribution concessions in France, and comprise the following:

- the concession-granting authority's rights in existing assets (its right to recover all the concession assets):
 - the value in kind of the facilities (the net book value of assets operated under concessions),
 - less any as yet unamortised financing provided by the operator;
- the concession-granting authority's rights in assets to be replaced (the operator's obligations relating to assets due for replacement):
 - amortisation of financing by the grantor: this is a liability owed by the concession operator to the grantor and is recognised progressively as the asset is used,

- provision for replacement: this provision exclusively concerns assets due for replacement before the end of concessions using the 1992 concession agreement model, except for the rising mains transferred in application of the ELAN law. It is accrued over the asset's useful life, based on the difference between the asset's replacement value for identical capacity and functions, and the original value. In application of the 2017 concession model, used in almost all current concession agreements, no provision for renewal is now established for concession assets. The balance of provisions at the end of the previous concession agreement have been transferred to the new concession and the provisions for renewal continue to be used for their intended purpose.

When assets are replaced, amortisation recognised on the portion of assets considered to be financed by the grantor, and the provision for replacement established for the relevant asset, are cancelled and transferred to rights in existing assets. Any excess provision is taken to income.

During the concession, the grantor's rights in assets to be replaced are thus transferred upon the asset's replacement to become the grantor's rights in existing assets, with no outflow of cash to the benefit of the grantor.

The Group considers that the obligations related to assets to be replaced are to be valued on the basis of the special clauses contained in the concession agreements. Under this approach, these obligations are stated at the value of the contractual obligations as calculated and reported annually in the reports to the grantors. This contractual value also reflects the eventuality that the EDF group may one day lose its status as the mandatory concession operator.

The changes in special concession liabilities for existing assets and assets to be replaced are as follows:

(in millions of euros)	31/12/2023	31/12/2022
Value in kind of assets ⁽¹⁾	57,300	55,788
Unamortised financing by the operator	(33,176)	(31,681)
Rights in existing assets – net value	24,124	24,107
Amortisation of financing by the grantor	17,007	16,331
Provisions for replacement	8,879	9,021
Rights in assets to be replaced	25,886	25,352
SPECIAL FRENCH PUBLIC ELECTRICITY DISTRIBUTION CONCESSION LIABILITIES	50,010	49,459

⁽¹⁾ Including contributions received to finance concession assets, amounting to €144 million (€127 million in 2022).

Note 12 Investments in associates and joint ventures

Investments in associates and joint ventures are as follows:

(in millions of euros)	Notes	31/12/2023			31/12/2022	
		Ownership%	Share of net equity	Share of net income	Share of net equity	Share of net income
CTE	12.1	50.10	1,793	190	1,766	250
Other investments (dedicated assets) of EDF SA	15.1.2	n.a.	1,850	(48)	1,944	79
Investments held by EDF Renewables	12.3	n.a.	2,509	(61)	2,519	(52)
Taishan (TNPJVC)	12.2	30.00	n.c.	n.c.	1 084	(102)
Investments in EDF Trading	12.3	n.a.	867	255	955	516
Other investments	12.3	n.a.	n.c.	n.c.	1 153	68
TOTAL			9,037	257	9,421	759

n.a. = not applicable.

n.c. = not communicated.

12.1 Coentreprise de Transport d'Électricité (CTE)

The key financial indicators for the CTE subgroup (on a 100% basis) are as follows:

(in millions of euros)	31/12/2023	31/12/2022
Non-current assets	21,528	20,484
Current assets	3,946	6,241
TOTAL ASSETS	25,474	26,725
Equity	3,579	3,525
Non-current liabilities	15,571	15,017
Current liabilities	6,324	8,183
TOTAL EQUITY AND LIABILITIES	25,474	26,725
Sales	6,131	4,928
Operating profit before depreciation and amortisation	1,891	1,841
Net income	380	498
Net indebtedness	13,287	10,831
Gains and losses recorded directly in equity	(39)	433
Dividends paid	287	356

CTE's affiliate, RTE (Réseau de Transport d'Électricité), is responsible for managing the high voltage and very high voltage public electricity transmission network in France. Enedis uses RTE's network to convey energy to the distribution network.

EDF's investment in CTE (50.1%) is accounted for by the equity method due to RTE's specific governance arrangements, and is entirely allocated to dedicated assets.

12.2 Taishan

12.2.1 Taishan financial indicators

As CGN (Taishan's parent company) publishes its consolidated financial statements later than the Group, the following table presents financial information for Taishan at 31 December 2022.

The key financial indicators published for Taishan (on a 100% basis) are as follows:

(in millions of euros)	31/12/2022	31/12/2021
Non-current assets	11,838	12,265
Current assets	884	900
TOTAL ASSETS	12,722	13,165
Equity	3,606	4,036
Non-current liabilities	7,457	6,680
Current liabilities	1,659	2,449
TOTAL EQUITY AND LIABILITIES	12,722	13,165
Sales	640	919
Net income	(327)	(131)
Dividends paid	-	-

12.2.2 Transactions between the EDF group and Taishan

EDF owns 30% of Taishan Nuclear Power Joint Venture Company Limited (TNPJVC), which was set up to build and operate two EPR nuclear reactors in Taishan, in the province of Guangdong in China. Comprising two 1750MW EPR reactors, Taishan nuclear power plant is the biggest cooperation project between China and France in the energy sector. CGN holds a 51% stake and Guangdong Energy Group a 19% stake.

Following the start of commercial operation by the first reactor on 13 December 2018, the second reactor began commercial operation on 7 September 2019.

On 20 March 2019, the NDRC (National Development and Reform Commission) attributed regulated tariffs to the first three third-generation nuclear projects in China, one of which is Taishan. The tariff attributed to Taishan was set at RMB435/MWh until the end of 2021, with retroactive effect to the date the first unit was commissioned (13 December 2018). The indexing mechanisms applicable from 2022 were not set out in this decision and are still currently unknown. The NDRC announced that the current tariffs would be extended to 3rd generation plants (including Taishan).

A provision has been established in consideration of the persistent uncertainties regarding the level of tariff changes that could threaten the recoverable value of the investment accounted for by the equity method (this provision is included in "Provisions for contingencies related to subsidiaries and investments" in note 17.2).

On 14 June 2021, during its second cycle of operation, a build-up of noble gases was detected in the primary circuit of reactor 1 at the Taishan plant. The Chinese ministry for ecology and the environment stated that this was due to a few unsealed fuel rods. Following an initial analysis of the situation, on 30 July 2021 the operator of the Taishan plant decided to shut down reactor 1 to assess the situation in more detail, prevent it from progressing, and take remedial action. Defueling operations were completed on 22 August 2021. Inspections carried out on the fuel assemblies of Taishan reactor 1 following the technical issue encountered during its second operating cycle showed mechanical wear on certain assembly components. This phenomenon has already been encountered in several reactors in the French nuclear fleet. During the first half of 2022, EDF and Framatome contributed to drawing up the documentation to safely restart Taishan reactor 1, and supported TNPJVC for its examination by the Chinese authorities. On 15 August 2022, Taishan reactor 1 was reconnected to the Chinese electricity network after the final inspection by the competent Chinese authorities at the end of July 2022.

During the first quarter of 2023, Taishan reactor 1 was taken offline for a scheduled refuelling outage. As CGN stated in a press release of 9 June 2023, during that outage TNPJVC added some inspections and tests to collect data and experience for the unit's stable long-term operation. Reactor 1 was safely recoupled to the network on 27 November 2023.

Under the TNPJVC shareholder pact, EDF began an "interpretation" arbitration procedure in January 2021 in the Singapore International Chamber of Commerce against its partner CGN. The disagreement concerns the accounting policy for the power plant, particularly its depreciation period. EDF recommends a 60-year period in line with the plant's operating lifetime, while CGN considers it should be 41 years, ending at the same time as the entity TNPJVC. This accounting policy could influence the remuneration received by the EDF group through this partnership, particularly the residual interest when it ends. The Singapore International Chamber of Commerce gave its verdict in June 2023, and EDF began discussions with its partner regarding its implementation. On 6 June 2023, the Arbitration Tribunal ruled in favour of EDF. The final deadline for appeals passed on 19 September 2023.

12.3 Other investments in associates and joint ventures

The other investments held by EDF SA are included in dedicated assets (see note 15.1.2).

The other investments held by EDF Renewables are mainly located in North America, and to a lesser degree in Europe, China and Brazil.

Other investments in associates and joint ventures principally concern:

- JERA Global Markets (JERA GM), 33%-owned by EDF Trading, a company specializing in trading and optimization activities, particularly for liquified natural gas (LNG);
- the supercritical coal-fired plant owned by Jiangxi Datang International Fuzhou Power Generation Company Ltd. in China, 49% - owned by the Group;
- the dam owned by Compagnie Énergétique de Sinop (CES) in Brazil, 51% - owned by the Group;
- the Nachtigal dam in Cameroon, 40%-owned by the Group: reservoir impoundment was completed in the second half of 2023 and the whole power plant will be commissioned in the second half of 2024.

During 2023, €(240) million of impairment was booked in respect of investments in associates and joint ventures, principally concerning dedicated assets (€(86) million), the Jiangxi Datang International Fuzhou Power Generation Company Ltd. supercritical coal-fired plant in China (€(79) million), the Nearth na Gaoithe (NNG) project in the United Kingdom (€(54) million), and wind farms in Mexico (€(16) million).

In 2022, €(141) million of impairment was booked in respect of investments in associates and joint ventures, principally concerning associates of EDF Renewables (a net amount of €(121) million). €(139) million of this impairment (see note 10.8) concerns wind power assets in Texas, due to congestion problems on the electricity network. Some impairment was also booked in respect of unlisted assets held by EDF SA (EDF Invest) that are included in dedicated assets.

Principal developments in investments accounted for by the equity method in 2023

EDF Renewable won the contract for a 500MW solar power plant project in Oman

EDF Renewables and its partner Korea Western Power Corporation (KOWEPO) have signed financing agreements for the 500MW Manah 1 solar project. The consortium won the project and signed the power purchase agreement (PPA) on March 23, 2023. It will develop, finance, build and operate the new solar power plant, which is expected to be commissioned in the first quarter of 2025.

EDF Group and Maple Power were awarded a 1GW offshore wind farm project off the coast of Normandy, France

Following the fourth offshore wind power tender launched in January 2021, the French Ministry for the Energy Transition selected Eoliennes en Mer Manche Normandie, the project company owned by the EDF Renewables (a subsidiary of EDF Group) and Maple Power consortium, to design, build, operate and decommission the future "Centre Manche 1" offshore wind farm (off the coast of Normandy). With an installed capacity of approximately 1GW, this facility should produce power equivalent to the annual consumption of over 1.5 million people, or around half of the electricity requirements of the Normandy region's inhabitants.

EDF and its partners laid the first stone of a biomass power plant in Ivory Coast

On July 2023, EDF launched the construction of BIOVEA, a 46MW biomass power plant that will use agricultural waste to produce enough electricity for the equivalent of 1.7 million people a year. The project is owned 40% by the Group and will avoid 4.5 million tonnes of CO2 emissions over the 25 years of its operation.

EDF Renewables and its partners won the tender for a 1.1GW solar project in Saudi Arabia

The consortium of Masdar, EDF Renewables (30%) and Nesma Company signed the Power Purchase Agreement and was selected to develop, build and operate the 1.1GW Al Henakiyah solar power plant. Once commissioned, this plant will produce the equivalent of the annual electricity consumption of around 190,000 homes, avoiding the emission of more than 1.8 million tonnes of CO2 each year.

Commissioning of the 2.1GW Al Dhafra plant in the United Arab Emirates

In November 2023, the Al Dhafra solar power plant in the United Arab Emirates was commissioned. This plant is owned 20% by the Group and has a capacity of 2GW, enough to supply 160,000 households and avoid around 2 million tonnes of CO2 emissions a year.

Signature of a joint development agreement for a 1.5GW hydropower project in Mozambique

In December 2023, the consortium formed by EDF (40%), TotalEnergies (30%) and Sumitomo Corporation (30%) was selected by the Government of Mozambique to develop the 1.5GW Mphanda Nkuwa (MNK) hydropower project. The Consortium will develop MNK jointly with local partners who will own 30% of the project while the consortium owns 70%. This project is expected to increase Mozambique's electricity production capacity by more than 50%, and could supply power for over 3 million households in Mozambique and neighbouring countries.

Note 13 Working capital

13.1 Working capital: composition and change

Changes in working capital during 2023 are as follows:

(in millions of euros)	Notes	31/12/2022	Monetary changes	Non-monetary changes	31/12/2023
Inventories and work-in-process	13.2	(17,661)	(381)	(50)	(18,092)
Trade receivables net of provisions	13.3	(24,844)	(2,198)	209	(26,833)
Trade payables	13.4	23,284	(3,595)	(2)	19,687
Compensation receivable for Public Energy Service charges (CSPE payable)	13.5.4	6,074	(4,044)	-	2,030
Other receivables and payables ⁽¹⁾	13.3.4 and 13.5	9,006	2,339	1,123	12,468
Other components of working capital ⁽²⁾		(117)	95	(606)	(628)
NET WORKING CAPITAL		(4,257)	(7,785)	674	(11,368)

⁽¹⁾ Excluding receivables and payables on acquisition/disposal of assets and investment subsidies.

⁽²⁾ Other components of working capital include CO₂ emission certificates and green certificates presented in intangible assets in the balance sheet, and operating derivatives.

Monetary changes in working capital were less favourable in 2023 at €(7,785) million, mainly as a result of a €(4,044) million decrease in the CSPE liability (see note 13.5.4), higher net margin calls in the trading activities (€2,814 million), and the €(381) million change in the net inventory position (see note 13.2).

The change in other receivables and payables includes monetary changes in CO₂ emission certificates and green certificates presented in intangible assets in the balance sheet, and operating derivatives.

Non-monetary changes include the effect of changes in the scope of consolidation, foreign exchange effects, changes in fair values and reclassifications. The variation in non-monetary changes in 2023 is mainly explained by the change in fair value of inventories and operating derivatives totalling €(790) million and other effects amounting to €126 million, mainly associated with the adjustment for loaded fuel.

13.2 Inventories

ACCOUNTING PRINCIPLES AND METHODS

Inventories are recognised at the lower of acquisition cost or net realisable value, except for inventories held for trading activities, which are carried at market value. Inventories consumed are generally valued by the weighted average unit cost method.

Cost includes all direct materials costs, labour costs, and a share of indirect production costs.

NUCLEAR FUEL

Inventory accounts include:

- nuclear materials, whatever their form during the fuel production cycle;
- and fuel components in the warehouse or in the reactor.

The stated value of nuclear fuel and materials and work-in-progress is determined based on direct processing costs including materials, labour and subcontracted services (e.g. fluorination, enrichment, fabrication, etc.).

In accordance with regulatory obligations specific to each country, inventories of fuel (new or not entirely consumed) may also comprise expenses for spent fuel management and long-term radioactive waste management, with corresponding provisions or debts in the liabilities, or full and final payments made when the fuel is loaded.

In France, in application of the concept of "loaded fuel" as defined in the article D594-1 of the Environment code, the cost of inventories for fuel loaded in the reactors but not yet irradiated includes expenses for spent fuel management and long-term radioactive waste management. The corresponding amounts are taken into account in the relevant provisions.

In compliance with IAS 23, interest expenses incurred in financing inventories of nuclear fuels are charged to expenses for the period provided these inventories are manufactured in large quantities on a repetitive basis.

Nuclear fuel consumption is determined by component (natural uranium, fluorination, enrichment, fuel assembly fabrication) as a proportion of the expected output when the fuel is loaded in the reactor. These quantities are valued at weighted average cost of inventories. Inventories are periodically corrected in view of forecast spent quantities based on neutronic measurements and physical inventories.

OTHER INVENTORIES

Other inventories comprise:

- other fuels, comprising fossil fuels required for operation of fossil-fired power plants and gas stocks;
- other operating supplies, consisting of operating materials and equipment such as spare parts supplied under a maintenance programme (excluding capitalised strategic safety spare parts);
- goods and services in progress, particularly relating to the businesses of EDF Renewables, Dalkia and Framatome;
- other inventories, mainly consisting of certificates issued under the various environmental schemes (see notes 5.5.4 and 10.2) and capacity obligation mechanisms (capacity guarantees in France – see note 5.1).

Other non-trading operating inventories are generally valued at weighted average cost including direct and indirect purchasing costs.

Impairment of spare parts principally depends on the turnover of these parts.

The carrying value of inventories, broken down by nature, is as follows:

(in millions of euros)	31/12/2023			31/12/2022		
	Gross value	Provision	Net value	Gross value	Provision	Net value
Nuclear fuel	11,760	(431)	11,329	10,737	(422)	10,315
Other fuel	1,556	(260)	1,296	2,029	(2)	2,027
Other supplies	2,047	(413)	1,634	1,878	(422)	1,456
Work-in-progress for production of goods and services	771	(22)	749	622	(35)	587
Other inventories	3,144	(60)	3,084	3,326	(50)	3,276
TOTAL INVENTORIES	19,278	(1,186)	18,092	18,592	(931)	17,661

The long-term portion (more than one year) mainly concerns nuclear fuel inventories and amounts to €9,235 million at 31 December 2023 (8,557 million at 31 December 2022).

The change in inventories in 2023 is principally explained by the increase in nuclear fuel inventories and higher impairment of the coal and gas inventories presented in "Other fuel".

13.3 Trade receivables

ACCOUNTING PRINCIPLES AND METHODS

Trade receivables are initially recognised at the fair value of the consideration received or receivable, and subsequently carried at amortised cost or at fair value through OCI.

Trade receivables also include the value of unbilled receivables for energy already supplied, which are presented net of advances received from customers who pay in regular monthly instalments.

The Group applies IFRS 9's simplified approach to measure expected credit losses on trade receivables, using provision matrices established on the basis of credit loss histories.

Details of net trade receivables are as follows:

(in millions of euros)	Note	31/12/2023	31/12/2022
Trade receivables, gross value – excluding EDF Trading contract assets	13.3.3	24,232	21,568
Trade receivables, gross value – EDF Trading		286	441
Impairment		4,341	4,598
		(1,740)	(1,322)
TRADE RECEIVABLES - NET VALUE		26,833	24,844

Most trade receivables mature within one year.

Advances received from customers in France who pay in regular monthly instalments, amounting to €1,808 million at 31 December 2023 (€7,423 million at 31 December 2022), are deducted from trade receivables.

Trade receivables increased between 31 December 2022 and 31 December 2023 in keeping with the change in sales by the different segments: France – Generation and supply €4.5 billion, Italy €(1.2) billion and Dalkia €(0.4) billion.

13.3.1 Trade receivables due and not yet due

(in millions of euros)	31/12/2023			31/12/2022		
	Gross value	Provision	Net value	Gross value	Provision	Net value
TRADE RECEIVABLES	28,573	(1,740)	26,833	26,166	(1,322)	24,844
overdue by up to 6 months	2,263	(392)	1,871	2,037	(183)	1,854
overdue by 6-12 months	1,100	(401)	699	678	(242)	436
overdue by more than 12 months	1,066	(728)	338	1,117	(551)	566
Trade receivables due	4,429	(1,521)	2,908	3,832	(976)	2,856
Trade receivables not yet due	24,144	(219)	23,925	22,334	(346)	21,988

13.3.2 Assignment of receivables

ACCOUNTING PRINCIPLES AND METHODS

The EDF group manages several factoring and securitisation programmes that are used to assign eligible trade receivables in return for a cash payment.

The trade receivables concerned are derecognised in accordance with IFRS 9 when the Group:

- (i) has transferred its rights to receive payments relating to the asset or fulfilled its obligation to pay cash flows received from a third party (other than a consolidated structured entity) under a transfer agreement, and
- (ii) has transferred substantially all of the risks and rewards attached to the receivables.

Otherwise, the receivables assigned remain in the balance sheet assets, and the financing received is treated as financial liabilities.

In 2023, the Group entered into a securitisation contract through a Securitisation Fund (a special purpose entity). As this entity is consolidated, the receivables concerned have not been derecognised.

(in millions of euros)	31/12/2023	31/12/2022
Trade receivables assigned and retained in the balance sheet	57	324
Trade receivables assigned and derecognised	1,764	2,470

The Group assigned trade receivables for a total of €1,764 million at 31 December 2023, mainly concerning Edison, EDF SA, Dalkia and Luminus (€2,470 million at 31 December 2022).

13.3.3 Contract assets

Contract assets are rights held by an entity to receive a consideration in return for goods or services supplied to customers, when such rights are conditional on something other than the passage of time. Most contract assets mature within one year.

The contract assets included in receivables represent an amount of €286 million at 31 December 2023 and €441 million at 31 December 2022 and mainly concern Framatome, Dalkia, EDF Renewables and the Other International segment.

13.3.4 Other receivables

Details of other receivables are as follows:

(in millions of euros)	31/12/2023	31/12/2022
Prepaid expenses	1,609	1,592
VAT receivables	2,193	1,968
Other tax receivables	315	274
Other operating receivables	7,067	13,496
OTHER RECEIVABLES	11,184	17,330
Non-current portion	2,110	2,165
Current portion	9,074	15,165
Gross value	11,252	17,390
Impairment	(68)	(60)

At 31 December 2023, other receivables include €3.1 billion of margin calls made in the trading activity (€5.2 billion in 2022), which decreased essentially as a result of positions taken in 2022 being closed. The amounts of margin calls recognised in assets cannot be netted with the margin calls recognised in liabilities (see note 13.5).

At 31 December 2023, other receivables also include tax receivables of €2,508 million (€2,242 million at 31 December 2022) and prepaid expenses of €1,609 million (€1,592 million at 31 December 2022).

13.4 Trade payables

(in millions of euros)	31/12/2023	31/12/2022
Trade payables – excluding EDF Trading	14,533	16,001
Trade payables – EDF Trading	5,154	7,283
TRADE PAYABLES	19,687	23,284

The decrease in trade payables is mainly explained by changes in market prices, and therefore concerns various Group entities.

The Group has a reverse factoring programme allowing suppliers to transfer their receivables on EDF to a factoring company, at their own initiative. For the Group, this programme does not cause any change in the substance and features of the receivables held by suppliers on EDF. In particular it does not affect the sequences of operating cash flows. The associated liabilities are therefore included in “trade payables” in the Group’s financial statements.

13.5 Other liabilities

Details of other liabilities are as follows:

(in millions of euros)	31/12/2023	Including contract liabilities	31/12/2022	Including contract liabilities
Advances and progress payments received	4,011	2,099	3,973	2,025
Liabilities related to property, plant and equipment	5,464	-	4,631	-
Tax liabilities	4,740	-	3,488	-
Social charges	6,236	-	5,865	-
Deferred income on long-term contracts	3,548	3,548	3,180	3,144
Other deferred income ⁽¹⁾	1,267	857	1,172	694
Other	7,394	-	16,163	-
OTHER LIABILITIES	32,660	6,504	38,472	5,863
Non-current portion	5,685	3,539	4,968	2,929
Current portion	26,975	2,965	33,504	2,934

⁽¹⁾Including the initial payment made under the Fessenheim compensation protocol received in 2020 (see note 5.5.4).

13.5.1 Advances and progress payments received

Advances and progress payments received comprise €719 million of payments made by the customers in Framatome's long-term contracts (€630 million at 31 December 2022).

13.5.2 Tax liabilities

At 31 December 2023, tax liabilities mainly include an amount of €20 million for the CSPE to be collected by EDF on energy supplied but not yet billed, less the CSPE tax collected on advances from customers who pay in regular monthly instalments (€116 million at 31 December 2022).

13.5.3 Deferred income on long-term contracts

EDF's deferred income on long-term contracts at 31 December 2023 comprises €2,089 million (€1,777 million at 31 December 2022) of partner advances made to EDF under the nuclear plant financing plans.

Deferred income on long-term contracts also includes the remaining balance of the advance of €1.7 billion paid to the EDF group in 2010 under the agreement with the Exeltium consortium. This advance is transferred to the income statement progressively over the term of the contract (24 years).

13.5.4 Other

The final line of the table of other liabilities includes a €2,030 million operating liability payable to the State in connection with the CSPE at 31 December 2023 (€6,074 million at 31 December 2022).

It also includes €0.9 billion of margin calls made in the trading activity (€5.9 billion in 2022). The amounts of margins calls recognised in liabilities cannot be netted with margin calls recognised in assets (see note 13.3.4).

Finally, this item includes investment subsidies received during 2023, amounting to €325 million (€566 million in 2022). Investment subsidies received by Group companies are included in liabilities under the heading "Other liabilities" and transferred to income as and when the economic benefits of the corresponding assets are utilised.

EDF's public service charges

The amount of public service charges to be compensated to EDF for 2023 is €14,126 million, explained as follows:

- an amount of €(2,193) million for purchase obligations in 2023. These expenses are negative because of high market prices, which were above the price of EDF's purchase obligations;
- an amount of €13,992 million for the sales revenue shortfall caused by the cap on sale prices to final customers. The electricity tariff cap gave rise to compensation of €12,446 million and the electricity buffer gave rise to compensation of €1,458 million, while the compensation for the gas tariff cap amounted to €88 million;
- an amount of €2,297 million for surplus generation costs in non-interconnected and solidarity zones.

The amounts received in 2023 out of the State's General Budget totalled €10,010 million, corresponding to the €2,053 million balance outstanding for the year 2022, and payments of €7,957 million for the year 2023.

The compensation mechanism for public energy service charges in France is presented in note 5.5.1.

13.5.5 Contract liabilities

Contract liabilities represent an entity's obligations to provide customers with goods or services for which it has already been paid, or for which payment is due.

Changes in contract liabilities were as follows:

(in millions of euros)	31/12/2022	Amounts recorded during the period	Amounts transferred to sales during the period	Amounts cancelled during the period with no impact on sales	Effect of unwinding the discount	Change in scope of consolidation	Foreign exchange effect	31/12/2023
Advance payments received	2,025	1,472	(1,424)	(28)	-	34	20	2,099
Deferred income on long-term contracts	3,144	949	(591)	-	46	8	(8)	3,548
Other deferred income	694	726	(605)	65	-	(22)	(1)	857

These liabilities comprise the majority of advances and progress payments received, amounting to €2,099 million (principally concerning the Framatome, United Kingdom and France – Regulated Activities segments), and the majority of deferred income (on long-term and other contracts), amounting to €4,405 million (principally concerning the France – Generation and Supply segment). They thus total €6,504 million at 31 December 2023 (€5,863 million at 31 December 2022).

Contracts expiring in more than one year on which obligations are unfulfilled or partially fulfilled at the reporting date (including operating sale commitments, amounting to €7.1 billion, see note 21.2.1) should generate sales revenues of approximately €13,602 million which have not yet been recognised. €892 million of these sales revenues will be recognised progressively until 2034 on the Exeltium contract, and the balance will be recognised over the operating period for contracts relating to jointly-operated power plants, and over the term of the contract for other firm sale contracts (excluding energy sales).

Note 14 Equity

14.1 Share capital

ACCOUNTING PRINCIPLES AND METHODS

Share issue expenses correspond exclusively to external costs expressly related to the capital increase. They are charged against the issue premium at their net-of-tax value.

Other expenses are classified as expenses of the period.

At 31 December 2023, EDF's share capital amounts to €2,084,365,041 comprising 4,168,730,082 fully subscribed and paidup shares with nominal value of €0.50, owned 100% by the French State since the 8 June 2023.

At the end of 2023, all of the 218,696,799 OCEANE bonds were converted, leading to successive capital increases totalling €140,950,086.50 after the issuance of 281,900,173 new shares (see note 14.4).

On 31 July 2023, the 888,511 treasury shares were cancelled for the net value of €7,230,061.14, leading to a non-loss-driven capital reduction of €444,255.50 and a decrease of €6,875,805.64 in reserves.

14.2 Dividends

At the General Shareholders' Meeting of 28 June 2023 it was decided not to pay out any dividend in 2023 in respect of 2022.

No interim dividend was paid for 2023.

14.3 Perpetual subordinated bonds

ACCOUNTING PRINCIPLES AND METHODS

The perpetual subordinated bonds issued by the Group ("hybrid" bond issue) incorporate options for redemption at the initiative of EDF. These options may be exercised after a minimum period that depends on the specific terms of each issue, and subsequently at each coupon date or in the event of highly specific circumstances. The annual yield is fixed and reviewable based on contractual clauses that vary according to the specific terms of the issuance. There is no obligation for EDF to make any payment, due to the existence of contractual clauses entitling it to defer payment indefinitely.

However, those clauses stipulate that any deferred payments must be made in the event of a dividend distribution. All these features give EDF an unconditional right to avoid paying out cash or another financial asset for the principal or interest. Consequently, in compliance with IAS 32, these bonds are recorded as equity instruments and any payment made is treated in the same way as dividends.

At 31 December 2023, perpetual subordinated bonds carried in equity amounted to €12,009 million (less net-of-tax transaction costs) (€11,722 million at 31 December 2022).

On 8 June 2023, the Group issued hybrid notes that were recognised in equity at the value of €1,377 million. In parallel, EDF launched a contractual cash redemption offer for the outstanding bonds of the \$1,500 million perpetual subordinated bond issue of January 2014, that were included in equity at the value of €1,093 million at 31 December 2022. On 20 June 2023 and 7 July 2023, EDF redeemed bonds for a total US\$904 million (US\$901 million and US\$3 million respectively), the equivalent of €823 million.

On 14 December 2023, EDF announced its intent to exercise the option to redeem the outstanding hybrid notes, which totalled \$596 million and were recorded in equity at the value of €546 million at 31 December 2023. These notes were redeemed at the First Call Date (22 January 2024) and were reclassified as financial liabilities at 31 December 2023 at a value that includes the corresponding foreign exchange effects.

Interest paid by EDF to the bearers of perpetual subordinated bonds issued totalled €630 million in 2023 (€606 million in 2022). The resulting cash payout is reflected in a corresponding reduction in Group equity.

In January 2024, EDF paid interest of around €187 million to the bearers of perpetual subordinated bonds.

Perpetual subordinated bonds in the accounts of EDF

(in millions of currency units)

Entity	Issue ⁽¹⁾	Nominal amount	Currency	Redemption option	Coupon
EDF	01/2013	1,250	GBP	13 years	6.00%
EDF	01/2013	1,250	EUR	12 years	5.38%
EDF	01/2014	1,000	EUR	12 years	5.00%
EDF	01/2014	750	GBP	15 years	5.88%
EDF	10/2018	1,250	EUR	6 years	4.00%
EDF	12/2019	500	EUR	8 years	3.00%
EDF	09/2020	850	EUR	6.5 years	2.88%
EDF	09/2020	1,250	EUR	10 years	3.38%
EDF	06/2021	1,250	EUR	7 years	2.63%
EDF	12/2022	1,000	EUR	6 years	7.50%
EDF	06/2023	1,500	USD	10 years	9.13%

⁽¹⁾ Date funds were received.

14.4 Convertible green bonds (OCEANes)

ACCOUNTING PRINCIPLES AND METHODS

OCEANE bonds, which are convertible by remittance of a fixed number of shares in exchange for a fixed amount of cash (the “fixed-for-fixed” rule) give rise to recognition of a debt component and an equity component, in accordance with IAS 32.

On 8 September 2020, EDF made an issuance of Green Bonds convertible into new shares and/or exchangeable for existing shares (*OCEANes Vertes*) with the nominal amount of €2,400 million and an issue value of €2,569 million.

882,340 OCEANE bonds were converted into new shares during 2022, giving rise to creation of 1,137,336 shares and a €9.65 million increase in the Group’s equity, including €0.57 million of share capital.

Through its public tender offer (see note 2), the French government acquired 127,147,355 OCEANE bonds through this Simplified Tender Offer, with the result that it held 214,979,011 OCEANE bonds or 98.30% of the total portfolio of OCEANes at 31 December 2022.

Following the squeeze-out on 8 June 2023, the remaining OCEANE bonds were transferred to the State, giving rise to conversion of all those bonds on 13 June 2023, and delisting of EDF’s OCEANE bonds from Euronext Access.

During 2023, all of the 218,696,799 OCEANE bonds existing at 31 December 2022 were converted into 281,900,173 new shares.

These operations of 2023 caused an increase of €2,390 million in the Group’s equity, including a €141 million increase in the share capital.

14.5 Non-controlling interests (minority interests)

The following table presents details of the principal non-controlling interests:

(in millions of euros)	31/12/2023			31/12/2022	
	Ownership %	Equity (non-controlling interests)	Net income attributable to non-controlling interests	Equity (non-controlling interests)	Net income attributable to non-controlling interests
Principal non-controlling interests:					
EDF Energy Nuclear Generation Ltd.	20.00%	2,014	136	2,198	142
NNB Holding Company (HPC) Ltd.	32.28%	5,349	(2,703)	6,778	(514)
NNB Holding Company (SZC) Ltd.	50.56%	1,475	-	719	-
EDF Investissements Groupe SA	7.54%	520	13	519	11
Luminus SA	31.37%	698	25	538	(49)
Framatome	24.50%	218	(34)	63	(12)
Other non-controlling interests		1,677	158	1,457	137
TOTAL		11,951	(2,404)	12,272	(285)

Non-controlling interests in EDF Energy Nuclear Generation Ltd., which is owned 80% by the Group *via* EDF Energy, correspond to Centrica's share.

Non-controlling interests in NNB Holding Company (HPC) Ltd, the holding company for the Hinkley Point C project, which is owned 67.7% by the Group *via* EDF Energy, correspond to CGN's share.

Non-controlling interests in NNB Holding Company (SZC) Ltd, the holding company for the Sizewell C project, which is owned 49.4% by the Group *via* EDF Energy, correspond to His Majesty's Government's share in the project at 31 December 2023 after its investment made on 30 November 2022 and the withdrawal at the same date of CGN, which held a 20.00% share (see note 10.6).

Non-controlling interests in EDF Investissements Groupe correspond to the investment held by Natixis Belgique Investissements.

Non-controlling interests in Luminus correspond principally to the investments held by Belgian local authorities, and partner contributions to the Seraing CCGT project.

Non-controlling interests in Framatome, which is owned 75.5% by the Group *via* EDF SA, correspond to the 19.5% share held by Mitsubishi Heavy Industries and the 5% share held by Assystem. On 25 January 2024, EDF acquired Assystem's 5% share, and thus raised its investment in the Framatome Group to 80.5% (see note 23).

Other non-controlling interests principally consist of the minority interests in subsidiaries of the Edison and EDF Renewables subgroups.

Other non-controlling interests also include instruments in the form of bonds convertible into shares, issued by the Dalkia group and subscribed by minority interests, amounting to a total €96 million at 31 December 2023 (€129 million in 2022).

Note 15 Provisions related to nuclear generation and dedicated assets

ACCOUNTING PRINCIPLES AND METHODS

The Group recognises provisions when it has a present obligation (legal or constructive) arising from a past event, an outflow of resources will probably be required to settle the obligation, and the obligation amount can be estimated reliably.

If it is anticipated that all or part of the expenses covered by a provision will be reimbursed, the reimbursement is recognised under receivables if and only if the Group is reasonably certain of receiving it.

Provisions are determined based on the Group's expectation of the cost necessary to settle the obligation. Estimates are based on management data from the information system, assumptions adopted by the Group, and if necessary, experience of similar transactions or operations, based on independent expert reports, or contractor quotes. The various assumptions are reviewed for each closing of the accounts.

In the case of decommissioning provisions for power plants in operation, adjustments are recorded *via* fixed assets.

The discount effect generated at each closing to reflect the passage of time is recorded under "Discount effect" in financial expenses.

Changes in provisions resulting from a change in discount rates, a change in the disbursement schedule or a change in contractor quote are recorded:

- as an increase or decrease in the corresponding assets, up to the net book value, if the provision was initially covered by balance sheet assets;
- in the income statement in all other cases.

Provisions related to nuclear generation mainly cover the following:




- back-end nuclear cycle expenses: provisions for spent fuel management, for waste removal and conditioning and long-term radioactive waste management are established in accordance with the obligations and final contributions specific to each country;
- costs for decommissioning power plants;
- costs relating to fuel in the reactor when the reactor is shut down (provisions for last cores). These correspond to the cost of the fuel stock in the reactor that is not totally spent at the time of the final reactor shutdown and cannot be reused due to technical and regulatory constraints, the cost of processing for that fuel, and the cost of removal and storage of the resulting waste.

Obligations can vary noticeably depending on each country's legislation and regulations, and the technologies and industrial scenarios involved.

The breakdown between current and non-current provisions related to nuclear generation is as follows:

(in millions of euros)	31/12/2023			31/12/2022		
	Current	Non-current	Total	Current	Non-current	Total
Provisions for the back-end of the nuclear cycle	2,069	28,193	30,262	1,602	24,982	26,584
Provisions for decommissioning and last cores	1,269	32,013	33,282	1,539	31,039	32,578
Provisions related to nuclear generation	3,338	60,206	63,544	3,141	56,021	59,162

The breakdown of provisions by company is shown below:

(in millions of euros)	 EDF	 EDF Energy	 Belgium	Total
	Note 15.1	Note 15.2	Note 15.3	
Provisions for spent fuel management	13,876	1,238	-	15,114
Provisions for waste removal and conditioning	-	406	-	406
Provisions for long-term radioactive waste management	13,205	1,173	364	14,742
PROVISIONS FOR THE BACK-END OF THE NUCLEAR CYCLE AT 31/12/2023	27,081	2,817	364	30,262
Provisions for the back-end of the nuclear cycle at 31/12/2022	23,854	2,723	7	26,584
Provisions for nuclear plant decommissioning	18,419	10,277	596	29,291
Provisions for last cores	2,720	1,271	-	3,991
PROVISIONS FOR DECOMMISSIONING AND LAST CORES AT 31/12/2023	21,139	11,548	596	33,282
Provisions for decommissioning and last cores at 31/12/2022	19,528	12,425	625	32,578
PROVISIONS RELATED TO NUCLEAR GENERATION AT 31/12/2023	48,220	14,365	960	63,544
Provisions related to nuclear generation at 31/12/2022	43,382	15,148	632	59,162

The movement in provisions for the back-end of the nuclear cycle, provisions for decommissioning and provisions for last cores break down as follows:

(in millions of euros)	31/12/2022	Increases	Decreases	Discount effect	Translation adjustments	Other movements	31/12/2023
Provisions for spent fuel management	12,663	2,490	(1,050)	698	26	287	15,114
Provisions for waste removal and conditioning	373	-	-	25	8	-	406
Provisions for long-term radioactive waste management	13,548	372	(324)	892	22	232	14,742
Provisions for the back-end of the nuclear cycle	26,584	2,862	(1,374)	1,615	56	519	30,262
Provisions for nuclear plant decommissioning	29,015	294	(904)	1,724	231	(1,069)	29,291
Provisions for last cores	3,563	-	-	179	23	226	3,991
Provisions for decommissioning and last cores	32,578	294	(904)	1,903	254	(843)	33,282
PROVISIONS RELATED TO NUCLEAR GENERATION	59,162	3,156	(2,278)	3,518	310	(324)	63,544
Current portion	3,141						3,338
Non-current portion	56,021						60,206
EDF SA	43,382						48,220
<i>Provisions within the scope of the law of 28 June 2006</i>	<i>42,187</i>						<i>47,001</i>
United Kingdom	15,148						14,365
Belgium	632						960

The change in provisions related to nuclear generation in 2023 is mainly due to:

- the signature in France of an agreement on the principles of future amendments for the period 2024-2026 to the 2008-2040 framework agreement with Orano Recyclage concerning removal, processing and recycling of spent fuel, leading to a €2,216 million increase in provisions for spent fuel management (€1,926million presented in “Increases” and €290 million in “Other movements”) and the €2,109 million cost of unwinding the discount, presented in the “discount effect” (see note 15.1.1.1);
- an update to the cost estimate base on Integrated Plan 24, approved by the Non-Nuclear Liabilities Assurance team (NLA), and a release from the provision following cost underspend within the year, resulting in a €(664) million decrease in provisions for the back-end of the nuclear cycle and decommissioning, and a €(406) million increase in the real discount rate resulting in a €(406) million decrease in provisions in the United Kingdom (see note 15.2);
- a €367 million increase mainly concerning Luminus and EDF Belgium, resulting from the final agreement reached between Engie and the Belgian State on all their nuclear waste-related obligations (see note 15.3).

15.1 Provisions related to nuclear generation and dedicated assets in France

15.1.1 Nuclear provisions

In France, the provisions established by EDF SA for the nuclear generation fleet result principally from the Law of 28 June 2006 on long-term management of radioactive materials and waste, and the associated implementing provisions concerning secure financing of nuclear expenses.

In compliance with the accounting principles described above:

- EDF books provisions to cover all obligations related to the nuclear facilities it operates;
- EDF also holds dedicated assets for secure financing of long-term obligations (see note 15.1.2).

The calculation of provisions incorporates a level of risks and uncertainties as appropriate to the operations concerned. It also includes uncertainty factors as described in note 1.3.4.2.

Details of changes in provisions for the back-end of the nuclear cycle, decommissioning and last cores in France are as follows:

(in millions of euros)	Notes	31/12/2022	Increases	Decreases	Discount effect	Other movements	31/12/2023
Provisions for spent fuel management	15.1.1.1	11,379	2,475	(913)	603	332	13,876
<i>amount unrelated to the operating cycle</i>		1,607	77	(21)	102	(5)	1,760
<i>amount outside the scope of the Law of 28 June 2006</i>		1,195	9	(45)	60	-	1,219
Provisions for long-term radioactive waste management	15.1.1.2	12,475	21	(325)	814	220	13,205
Provisions for the back-end of the nuclear cycle		23,854	2,496	(1,238)	1,417	552	27,081
Provisions for nuclear plant decommissioning	15.1.1.3	17,094	294	(224)	954	301	18,419
Provisions for last cores	15.1.1.4	2,434	-	-	118	168	2,720
Provisions for decommissioning and last cores		19,528	294	(224)	1,072	469	21,139
PROVISIONS RELATED TO NUCLEAR GENERATION		43,382	2,790	(1,462)	2,489	1,021	48,220
Provisions related to nuclear generation within the scope of the Law of 28 June 2006 ⁽¹⁾		42,187	2,781	(1,417)	2,429	1,021	47,001
Provisions related to nuclear generation outside the scope of the Law of 28 June 2006 ⁽¹⁾		1,195	9	(45)	60	-	1,219

⁽¹⁾ Scope of application of the law of 28 June 2006 on the sustainable management of radioactive materials and waste and its application decrees concerning secure financing of nuclear expenses. The provisions that do not fall within the scope of this law are provisions for the back-end of the nuclear cycle concerning non-EDF installations (see below).

The change in EDF SA's provisions related to nuclear generation is mainly explained by signature of an agreement on the principles of the future 2024-2026 amendment to the framework agreement with Orano Recyclage for the period 2008-2040, concerning the removal, processing and recycling of spent fuel. This resulted in an increase of €2,216 million in provisions for spent fuel management in 2023 (see note 15.1.1.1), recorded as follows:

- €1,926 million in "Increases", corresponding to provisions adjusted via profit and loss;
- €290 million in "Other movements", corresponding to changes in provisions backed by assets.

The discount effect comprises the €2,109 million cost of unwinding the discount, and the effect of adjusting cost estimates to 2023 economic conditions (see note 15.1.1.5), which were recorded in the income statement for provisions not backed by assets at the value of €396 million.

"Other movements" include the €405 million effect of adjusting cost estimates to 2023 economic conditions (see note 15.1.1.5) for provisions backed by assets.

Concerning non-EDF installations:

- EDF, Orano Recyclage and the French Atomic Energy Commission (Commissariat à l'Energie Atomique or CEA) signed an agreement in December 2004 which transferred the management and financing of final shutdown, decommissioning and waste recovery and reconditioning for the UP1 reprocessing facility at Marcoule to the CEA. In return, EDF paid the CEA a one-time financial contribution covering its full share of the cost of outstanding operations, while remaining the owner of its final waste and bearing only the transport and storage costs;
- EDF and Orano Recyclage signed two agreements in December 2008 and July 2010 defining the legal and financial terms for the transfer to Orano Recyclage of EDF's contractual obligations regarding its financial contribution to the dismantling of La Hague installations and the recovery and conditioning of waste. In application of those agreements, EDF paid Orano Recyclage a one-time financial contribution covering its full share of the cost of outstanding operations, while remaining the owner of its final waste and bearing only the transport and storage costs.

15.1.1.1 Provisions for spent fuel management

EDF's currently adopted strategy with regards to the fuel cycle, in agreement with the French State, is to process spent fuel, to recycle the separated plutonium in the form of MOX fuel (Mixed OXide of plutonium and uranium) and to recycle the reprocessed uranium.

The nominal quantities to be processed by Orano Recyclage at the request of EDF, totalling approximately 1,100 tonnes per year, are determined based on the quantity of recyclable plutonium in the reactors that are authorised to load MOX fuel (currently, 24 reactors under the authorisation for creation).

Consequently, provisions for spent fuel management (€13,876 million) mainly cover the following services to be provided by Orano Recyclage:

- removal of spent fuel from EDF's generation centres, and its reception and interim storage;
- processing, including conditioning and storage of recyclable matter.

The processing expenses included in these provisions concern spent fuel that can be recycled in existing facilities, including the portion in reactors but not yet irradiated.

Expenses are mainly measured based on forecast physical flows at the closing date, with reference to the contracts with Orano Recyclage which define the terms of application of the framework agreement for the period 2008-2040. The most recent contract, signed on 5 February 2016, covered the period 2016 - 2023. These contracts contain price indexes that are revised annually.

Negotiations with Orano Recyclage concerning the amendment for the period 2024-2026 began in September 2020 and EDF recognised a related provision for contingencies and losses of €854 million at 31 December 2022. A further exceptional allocation of €1,026 million was made during the first half of 2023, bringing the total provision to €1,880 million. This was EDF's best assessment at that date of how the outcome of the negotiations would affect its provisions, based on EDF's latest counter-proposal to Orano Recyclage made in April 2023.

In September 2023, the negotiations achieved convergence and an agreement was notably signed laying down the principles for the future contract (amendment for 2024-2026 of the master agreement), leading to a €2,216 million increase in provisions for spent fuel management (replacing the provision for contingencies and losses).

This agreement notably increases average contract fees by 39% (in 2024 euros) compared to the average defined for the period 2016-2023 (in 2020 euros). It takes account of changes in the economic conditions underlying the contract and the requirements expressed by Orano Recyclage regarding the necessary operating costs to enhance its plants' performance.

Furthermore, the provisions for spent fuel management incorporate specific provisions for the interim storage of spent fuel, which is a key issue for the back-end of the nuclear cycle because usage forecasts for Orano's interim storage facilities at La Hague for spent fuel from EDF's generation fleet suggest that the pools at La Hague could be saturated by 2030. To prevent saturation, the long-term storage capacity for spent fuel is to be increased by construction of a centralised fuel storage pool under EDF's supervision. Commissioning of the new pool is scheduled for 2034 and it will be operated by EDF. The following measures will also be taken to address storage needs.

For the period until the centralised storage pool is built, studies of transitional solutions were launched by Orano in 2019 in association with EDF and the Nuclear Safety Authority (*Autorité de Sûreté Nucléaire* - ASN). The preferred solution is densification of the existing pools at Orano's La Hague site. A supplementary solution would be to use a dry storage facility for plutonium (MOX) fuel and reprocessed uranium (RepU). The need for interim storage is accentuated by production issues over the last few years at Orano's Melox plant, which are gradually receding but affect the pace of processing in the short and medium term, with the result that pre-recycling quantities are temporarily increased.

Studies of the transitional solutions continued, notably on densification of the existing pools at Orano's La Hague site with the submission in December 2022 to the ASN of the application file for a notable modification. Development studies regarding this solution are expected to continue until 2024.

The provisions for spent fuel management also cover long-term storage of spent fuel that cannot currently be recycled in industrial facilities that already exist or are under construction: plutonium fuel (spent MOX fuel) or uranium fuel derived from processing (spent RepU), and fuel from Creys-Malville and Brennilis until fourth-generation reactors become available. Dedicated assets are held in association with these provisions, which is unrelated to the operating cycle as defined by the law of 2006 (see note 15.1.2). The provision is founded on a scenario assuming construction of a centralised storage pool at La Hague, to be managed by EDF as nuclear operator. This project was presented during the public debate on the National Plan for Managing Radioactive Matter and Waste (PNGMDR) in 2019-2020, and was subject to a specific public consultation organised by France's National Public Debate Commission (CNDP) that began on 22 November 2021 and ended on 8 July 2022. On 7 October 2022 EDF published a document on the lessons of the consultation and the company's responses, entitled "*Enseignements de la concertation préalable et suites données par EDF*".

In 2023 EDF set up a formal structure for continuous exchanges and dialogue, under the supervision of guarantors appointed by the CNDP. EDF also stated that at this stage, it is moving ahead with the project. More than 30 meetings with the public were held during 2023. This consultation procedure is continuing, ahead of a public inquiry that is expected to take place in 2025. The application for authorisation to create the installation is due to be filed at the end of the first quarter of 2024. In September 2023, EDF and Orano also concluded an agreement defining the terms on which Orano will make land available for the project.

In total, provisions for specific storage solutions for spent fuel amount to €219 million for the cost of densification of Orano's pools at La Hague, and €1,760 million for interim storage of spent MOX fuel and spent RepU, first at La Hague then in the centralised storage pool (these fuels cannot be recycled in existing facilities or facilities currently under construction).

Finally, in 2018, the Board of Directors approved resumption of reprocessed uranium recycling, which had been suspended in 2013 pending availability of a new industrial schema. The corresponding contracts were signed with the respective suppliers in the second quarter of 2018. The first assemblies were made at the Framatome plant in Romans sur Isère and loaded in 2023 into a 900MW reactor that is already authorised. Subject to completion of technical modifications and issuance of the necessary authorisations by the safety authority, other 900MW reactors and certain 1300MW reactors will be loaded with assemblies based on reprocessed uranium by 2027. Since 2021, the provision for storage of uranium for reprocessing included in the provisions for spent fuel management (€439 million) has been based on a 50-year operating lifetime for nuclear plants for the considered series, following the extension of the depreciation period of 1300MW-series plants from 40 to 50 years.

15.1.1.2 Provisions for long-term radioactive waste management

Provisions for long-term radioactive waste management concern the following future expenses:

- interim storage, removal and storage of radioactive waste packages resulting from spent fuel processing;
- direct storage, after long-term interim storage where relevant, of spent fuel that cannot be recycled in existing installations: specifically plutonium (MOX) fuel or uranium fuel derived from processing, and fuel from Creys-Malville and Brennilis;
- characterisation, processing, conditioning and interim storage of radioactive waste resulting from decommissioning and certain operating waste, and removal and final storage of this radioactive waste;
- EDF's share of the costs of studies, construction, operation and maintenance, shutdown and surveillance of existing and future storage centres.

The volumes of waste concerned by provisions include existing packages of waste and all waste to be conditioned, resulting in particular from plant decommissioning or spent fuel processing at La Hague (comprising all fuel in reactors at 31 December, irradiated or otherwise). These volumes are regularly reviewed, in keeping with the data declared for the purposes of the national waste inventory undertaken by ANDRA.

The provisions for long-term radioactive waste management break down as follows:

(in millions of euros)	Storage centre	31/12/2023	31/12/2022
Very low-level and low and medium-level waste	Very low-level waste: CIREs - Morvilliers (ANDRA)	3,176	2,958
	Low and medium-level waste: CSA - Soulaïnes (ANDRA)		
Long-lived low-level waste	Project under examination: Soulaïnes (ANDRA)	369	363
Long-lived medium and high-level waste	Geological storage centre (Cigéo project) / ICEDA conditioning and interim storage facility	9,660	9,154
PROVISIONS FOR LONG-TERM RADIOACTIVE WASTE MANAGEMENT		13,205	12,475

Very low-level and low and medium-level waste

Basis for estimation

Very low-level waste and low and medium-level waste come from nuclear facilities in operation or in the process of being decommissioned:

- very low-level waste mainly comes from nuclear plant decommissioning, and generally takes the form of metals (large components, piping, support structures, etc.) or rubble (concrete, earth, etc.). This type of waste is stored at surface level at the Morvilliers storage centre managed by ANDRA commissioned in 2003;
- low and medium-level waste (gloves, filters, resins, materials, etc.) is stored at surface level at the Soulaïnes storage centre managed by ANDRA, commissioned in 1992.

The cost of removing, processing and storing short-lived waste (very low-level and low and medium-level) is assessed on the basis of:

- current contracts with transporters, and ANDRA for operation of the existing storage centres;
- the costs of the plant run by the subsidiary Cyclife France (the Centraco site at Marcoule, commissioned in 1999) for processing some of this waste that can be melted or incinerated prior to storage in the ANDRA's centres;
- an estimate of the cost of a centralised facility for interim storage, segmentation and conditioning of major components such as steam generators.

For the management of very low-level waste, the regulations (decrees issued by the Ministry for the Ecological Transition) governing recycling of very low-level metallic waste in France were published in the *Journal Officiel* of 15 February 2022. EDF is thus continuing with the development of a segmentation and fusing facility to process and recycle the very low-level metallic waste resulting from decommissioning of nuclear plants. This project, called Technocentre, is led by EDF in collaboration with Orano, with a target commissioning date of 2031. In line with France's 5th National Plan for Managing Radioactive Matter and Waste, a roadmap setting out the objectives and timetable for the Technocentre project was sent to the DGEC in early 2023. Referral of the project to the National Commission of Public Debate was realised in mid-January 2024.

Developments in 2022

In 2022, the annual review of cost estimates incorporated the most recent assumptions regarding management of this waste. This had no significant impact on provisions.

Developments in 2023

As in 2022, the 2023 annual review of cost estimates incorporated the most recent assumptions regarding management of this waste, and had no significant impact on provisions. It should be noted that this review took account of the effects of France's Finance Law for 2024, which introduces a general tax on polluting activities in order to encourage recycling of very low-level metallic waste, and reduces the INB tax on storage centres once they are permanently shut down. These steps will modify the storage costs invoiced by ANDRA.

Long-lived low-level waste

Long-lived low-level waste belonging to EDF essentially consists of graphite waste from the ongoing decommissioning of the former UNGG (natural uranium graphite gas-cooled) nuclear plants.

As this waste has a long lifetime but is lower-level than long-lived medium and high-level waste, specific subsurface storage requirements apply under the French Law of 28 June 2006.

Following the initial geological investigations, in July 2015 ANDRA remitted a report on a proposed storage centre for long-lived low-level waste on a site located in the Soulaines region (Aube) in France. This report was submitted to the ASN for its opinion. Uncertainties remain about the site's capacity to accommodate all of the waste included in the baseline inventory of the long-lived low-level waste storage facility.

Further studies were planned under the 2016 - 2018 period of the National Plan for Managing Radioactive Matter and Waste (PNGMDR), concerning both the feasibility of this storage centre and the search for additional waste management solutions. The ASN's opinion on management of this waste, issued on 6 August 2020, and the 5th PNGMDR 2022-2026 (decree 2022-1547 and the implementation decision were published in the *Journal Officiel* of 10 December 2022) have set ANDRA the deadline of 2023 to produce a file presenting the technical and safety options selected for storage of long-lived low-level waste at the Vendevre-Soulaines site. The file is currently being finalised by ANDRA, to be sent to the ASN in early 2024.

The initial results of the studies conducted by EDF to characterise the radiological inventory of graphite waste in more detail suggest that it should be possible to store the graphite resulting from decommissioning of the first UNGG reactor to be dismantled (Chinon A2) not at the proposed Vendevre-Soulaines centre, but at the Aube storage centre for short-lived low-level waste. ANDRA has issued a preliminary opinion declaring that graphite waste falls within the scope of this centre's radiological specifications. Analyses of the nature of packages and waste concerned are continuing.

Long-lived medium and high-level waste

Long-lived medium and high-level waste essentially comes from processing of spent fuel, and to a lesser extent waste resulting from nuclear plant decommissioning (metallic components that have been inside the reactor).

The Cigéo project for an industrial geological storage centre

The French Law of 28 June 2006 requires reversible storage in deep geological layers for long-lived medium and high-level waste.

On 15 January 2016 the Ministry of Ecology, Sustainable Development and Energy issued a ministerial order setting the target cost for the Cigéo storage project at €25 billion under 2011 year-end economic conditions. The cost as defined constitutes an objective to be met by ANDRA, in compliance with safety standards set by the ASN, working in close cooperation with the operators of nuclear installations. This cost is expected to be updated by 2025.

The provisions for storage of long-lived medium and high-level waste, totalling €8,805 million (including preliminary interim storage of radioactive waste resulting from spent fuel processing, removal to the storage site, direct storage of spent fuel that cannot be recycled in existing installations), are based on the cost objective for storage, taking account of producers' shares that depend on the volumes and characteristics of the waste.

In application of this ministerial order, the cost of the Cigéo project will be regularly updated, at least at each key milestone in the course of the project's development (authorisation to create the facility, commissioning, end of the "pilot industrial phase", safety reviews) in accordance with the opinion of the ASN.

This project has seen the following developments since 2016:

- 2016: in April 2016, ANDRA sent the ASN a safety option report (DOS), and the law of 11 July 2016 clarified the concept of reversibility.
- 2018: in January 2018, the ASN issued its opinion on the DOS. It considered that the Cigéo project had reached satisfactory overall technological maturity at that stage. This opinion included a requirement for examination of alternatives to the proposal to store bituminous waste at Cigéo with no processing.
- 2019: in September 2019, a group of experts appointed by the DGEC to draw up a report on current bituminous waste management concluded that various options were feasible (storage or neutralisation) but stressed the importance of continuing the studies in order to identify the most appropriate option. A quadripartite research programme involving producers and ANDRA has been started, to support the application for authorisation to create the facility. The research will continue while the application is being examined for the Decree authorising creation.

- 2020: A detailed design review by a group of independent experts, organised at the request of the DGEC, reported its conclusions. While issuing a generally favourable opinion for ANDRA's submission, the experts made a certain number of recommendations for finalisation of the detailed design studies and the application for authorisation to create the centre, calling for closer involvement of EDF, Orano and the CEA on these matters.

Also in 2020, the French Finance Law for 2021, published in the *Journal officiel* of 30 December 2020, included a change to the tax treatment of this project (based on storage tax instead of the standard tax regime). At the 2023 year-end, the measures related to this law still remain to be defined and supervised by the French government to prevent any related cost increase for the Cigéo project.

- 2021: After its filing by ANDRA in August 2020, its examination by the government departments and a public inquiry from 15 September to 23 October 2021, the application for a *Déclaration d'utilité publique* (DUP) officially recognising the public utility of the Cigéo storage centre received a favourable opinion from the inquiry commissioners on 20 December 2021.
- 2022: On 8 July 2022, the DUP decree was published.

The delivery horizon for the first waste packages was also clarified. It should begin between 2035 and 2040 according to the ANDRA report of October 2022 summarising the consultations on the pilot industrial phase and governance of the Cigéo project, whereas at the end of 2021, producers were working on the hypothesis that the first waste packages would be received in 2031. Consequently, the provision was updated in 2022 to reflect this deferred reception date for the first packages, with no significant impact.

ANDRA filed an application to the Ministry for the Energy Transition in January 2023 for authorisation to create the Cigéo centre, and on 22 June 2023 the ASN published an announcement confirming that the application was admissible. This made it possible to begin technical examination of the application: the first meeting of the Permanent Group of experts is scheduled to take place in April 2024, the second in late 2024 and the third in mid-2025, with the ASN opinion expected in September 2025. In October 2023, following a request from the Council of State for a ruling, the Constitutional Council confirmed that the project is constitutional and preserves the rights of future generations.

The decree authorising creation is expected in 2027.

ICEDA

The provision established for long-lived medium and high-level waste also includes €855 million to cover the conditioning and interim storage of long-lived medium-level waste, principally at the ICEDA conditioning and storage facility (*Installation de Conditionnement et d'Entreposage des Déchets Activés*).

This facility, constructed at the Bugey power plant, received its first waste packages in September 2020 after the ASN authorised its commissioning on 28 July 2020. The ASN's decision approving and governing the conditioning of long-lived medium-level waste into packages at the ICEDA facility was formally received on 19 July 2021. Since then, the facility has completed five waste conditioning operations, including packaging of active operating waste from Fessenheim which arrived in September 2023.

15.1.1.3 Provisions for nuclear plant decommissioning

EDF bears full technical and financial responsibility for decommissioning of the basic nuclear facilities (*Installations Nucléaires de Base*, INB) it operates. The final shutdown and decommissioning process is governed by legal provisions and regulations set out in Articles L. 593-20 to L. 593-25 and R.593-65 to R.593-74 of the environmental code. It involves the following operations for each INB:

- a definitive shutdown declaration, to be made at least two years prior to the planned shutdown date:
 - since the Energy Transition Law of 17 August 2015, the final shutdown of the INB, which takes place during its operating phase, is considered separately from its dismantling, as a significant modification of lesser importance (simply requiring a declaration by the operator to the Minister and the ASN);
- a dismantling plan compiled by the operator and sent to the minister in charge of nuclear safety, which after examination by the authorities and a public inquiry, leads to a decree prescribing dismantling that authorises the start of dismantling operations;
- key-stage progress reviews submitted for the ASN's approval, with a safety file specific to the dismantling operations to be performed;
- an internal control process concerning significant modifications introduced by the operator in the case of operations that must be declared to or approved by the ASN;
- finally, once these operations are complete, declassification of the facility, which removes it from the scope of the laws governing basic nuclear facilities.

The decommissioning scenario adopted by EDF complies with France's Environmental Code, which requires as short a period as possible to elapse between final shutdown and dismantling in economically acceptable conditions and in compliance with the principles laid down in Article L. 1333 - 1 of the Public Health Code (radioprotection) and section II of Article L. 110 - 1 of the Environmental Code (protection of the environment). The intended end-state is industrial use: the sites will be restored to their original condition and will be reusable for industrial purposes.

The ongoing dismantling operations concern plants that were constructed and operated before the nuclear fleet currently in operation, known as "first-generation" plants, the Superphenix plant, and the Irradiated Materials Workshop in Chinon. These operations cover four different technologies: a heavy water reactor (Brennilis), a sodium-cooled fast-neutron reactor (the Superphenix at Creys-Malville), natural uranium graphite gas-cooled (UNGG) reactors (at Chinon, Saint Laurent and Bugey) and a pressurised water reactor (PWR, at Chooz).

For the Fessenheim PWR plant, the dismantling application is currently under examination by the ASN, and the operations completed concern the pre-dismantling phase.

Each of these operations is a first for EDF, and apart from the PWR, they concern reactor technologies for which there is little or no international experience. They therefore require development of new methods and technologies that are riskier than technologies for which feedback already exists. Decommissioning of the PWR is benefiting from past experience (essentially in the US and limited). The Chooz plant also has the specificity of being partly located in a cave: this means it is also a unique operation, generating experience that is not immediately transposable and involves specific challenges.

Based on the ongoing decommissioning operations at permanently shut-down plants (particularly the experience gained from the Chooz PWR), the studies conducted for the Summary Preliminary Plan for the two 900MW reactors at Fessenheim, and the preparatory work for dismantling of Fessenheim, it was possible at the end of 2021 to establish a detailed reference estimate of future decommissioning costs for the nuclear fleet currently in operation ("second-generation" plants). However, neither EDF nor any other operator has yet begun a decommissioning programme on a scale comparable to the current PWR fleet, and as a result the estimates include both opportunities and risks, especially associated with the scale effect.

The decommissioning provisions cover future decommissioning expenses as described above (excluding the cost of removing waste from the site and storing it, which is covered by the provisions for long-term waste management).

Details of changes in provisions for nuclear plant decommissioning are as follows:

(in millions of euros)	31/12/2022	Increases	Decreases	Discount effect	Other movements	31/12/2023
Provisions for decommissioning nuclear plants in operation	12,125	-	(9)	585	301	13,002
Provisions for decommissioning permanently shut-down nuclear plants	4,969	294	(215)	369	-	5,417
PROVISIONS FOR NUCLEAR PLANT DECOMMISSIONING	17,094	294	(224)	954	301	18,419

"Other movements" in provisions for decommissioning nuclear plants in operation principally include the effects of adjusting the cost estimates to 2023 economic conditions (see note 15.1.1.5), as well as the effects of the other changes in cost estimates detailed below, for provisions backed by assets.

"Decreases" reflect decommissioning expenses paid in 2023. "Increases" essentially correspond to improvements made during the year to the cost estimation methodology for provisions not backed by assets, detailed below.

For nuclear power plants currently in operation (PWR pressurized water reactor plants with 900MW, 1300MW and N4 reactors)

History of the calculation of provisions and the 2014-2015 Audit commissioned by the DGEC (*Direction Générale de l'Énergie et du Climat*)

Until 2013, provisions were estimated based on a 1991 study by the French Ministry of Trade and Industry, which set an estimated benchmark cost for decommissioning expressed in €/MW, confirming the assumptions defined in 1979 by the PEON commission. These estimates were confirmed from 2009 by a detailed study of decommissioning costs conducted by EDF at the representative site of Dampierre (four 900MW units), and the results of that study were corroborated by an intercomparison with the study carried out by consultants La Guardia, based mainly on the Maine Yankee reactor in the United States.

In 2014 the Dampierre study was reviewed by EDF to make sure that the previous calculations were still valid in view of recent developments and experience, both internationally and internally, which called the past estimates into question. For this review, the decommissioning provisions for plants in operation were based on costs resulting from the Dampierre study, in order to incorporate the company's best estimates and experience from inside and outside France. This change of estimate had no significant impact on the level of provisions at 31 December 2014.

Between June 2014 and July 2015, an audit of decommissioning costs for EDF's nuclear fleet currently in operation was conducted by specialised consulting firms, at the request of the French Department for Energy and Climate (*Direction Générale de l'Énergie et du Climat* or DGEC). On 15 January 2016 the DGEC published a summary of the audit report. It stated that although estimating the cost of decommissioning nuclear reactors is a demanding exercise due to relatively limited past experience, the prospects of changes in techniques and the distant timing of the expenditure, overall, the audit confirmed EDF's estimate of decommissioning costs for its nuclear fleet currently in operation. The DGEC also made a number of recommendations to EDF following this audit.

Revision in 2016 and current basis for estimation

In 2016, EDF revised the decommissioning estimate, in order to incorporate the recommendations resulting from the audit commissioned by the DGEC, and past experience gained from dismantling operations for first-generation reactors (particularly Chooz A).

A detailed analytical approach was used to revise this estimate, identifying all costs for the engineering, construction work, operation and waste processing involved in future decommissioning of reactors currently in operation. This led to figures based on detailed timetables for plant decommissioning. The approach adopted provided a more thorough assessment of costs specific to the first-of-their-kind units, estimated for each series based on transposition coefficients applied to the baseline costs for the initial 900MW unit, and the series and mutualisation effects, as these costs and effects are inherent to the fleet's size and configuration. In 2021, the reference estimate of decommissioning costs for the first 900MW unit was updated based on preliminary studies conducted in preparation for the decommissioning of Fessenheim, and experience gained at the beginning of the pre-dismantling phase.

The natures of the principal series and mutualisation effects used to arrive at the estimate are explained below.

Series effects (effects of work at a first-of-a-kind site on the following sites of the same series) are mainly of two types:

- first, in a fleet using the same technology, many studies do not need to be repeated each time;
- second, in a fleet using the same technology, robots and tooling can be largely reused from one site to another.

Mutualisation effects (effects between units on the same site, whether in operation or being decommissioned) are of several different types:

- some of them relate to the fact that several reactors may share common buildings and facilities on the same site, and these buildings and facilities will not have to be dismantled twice;
- certain costs are not higher when two or four reactors are dismantled on the same site. This is usually the case for surveillance costs, common equipment, and the cost of maintaining safe operating conditions on the site.

Due to mutualisation effects, dismantling a pair of reactors on the same site costs less than dismantling two standalone reactors on two different sites. In France, unlike other countries, there are no single reactors but sites with two or four, and in one case six reactors.

Series and mutualisation effects reduce the estimated decommissioning cost by 9% and 7% respectively compared to an estimate for PWR fleet currently in operation that ignores these effects. Series and mutualisation effects vary depending on the series: they are greater when there are more units in a series (series effect) and more units on a site (mutualisation effect), leading to a combined effect (series and mutualisation effect) of over 16% for the 900MW series.

In particular, series and mutualisation effects explain why it is not appropriate simply to compare the average dismantling cost per reactor between the French fleet and other countries' nuclear fleets.

Conversely, the estimates only marginally reflect changes in productivity and the learning effect. The DGEC-ordered external audit of the decommissioning cost for the fleet currently in operation considered that this approach resulted in a prudent estimation method.

For reasons of prudence, the estimate also includes an assessment of risks and uncertainties as follows:

- incorporation of uncertainties relating to each "elementary" block of costs, the schedule, series effects, mutualisation effects, transposition coefficients and fleet expenses;
- incorporation of risks, corresponding to the completion risks (which are identifiable and quantifiable, but only contingent). From the 2023 year-end, the financial consequences of these risks are based on valuation of a register of identified risks that incorporates the schedule impact (referring notably to an adapted version of the Fessenheim project risk register), rather than applying a flat-rate increase as previously).

The above method for assessing risks and uncertainties led to an overall margin of some 19.3% for the whole fleet currently in operation (22.4% for the reference Fessenheim cost estimate).

Since its in-depth revision in 2016 this cost estimate has been reviewed annually. The reviews have led to non-significant annual adjustments.

EDF also confirms its analyses through an international intercomparison, taking care to identify and characterise a number of factors that could distort direct comparisons, for example differences in the scope concerned by the cost estimate, or national and regulatory contexts.

Developments in 2022

The annual review of the estimate did not lead to any significant impact on provisions.

Developments in 2023

The annual review of the estimate in 2023 took into consideration methodological changes and experience acquired from Fessenheim, principally:

- methodological changes (which also apply to provisions for decommissioning permanently shut-down power plants and long-term waste management) regarding the assessment of requirements for research and engineering, a first reference⁽¹⁾ to the risk of obsolescence in existing equipment that is needed for dismantling, and the implementation of an analytical method for assessment of scheduling risks that was already applied in 2022 to most decommissioning projects for permanently shut-down power plants;
- inclusion of an assumption that decommissioning of the 900MW series will begin with pairs of reactors (as opposed to the previous assumption of independent start dates for each reactor), following experience gained from preparations for the Fessenheim decommissioning;
- an update to property costs (covering general operation and maintenance of the non-industrial sections of the plants), particularly by reference to the most recent cost figures for the Fessenheim site;
- reference to a register of risks identified in the PWR fleet (instead of the previous practice of assigning standard values to risks), applying the valuation methods used for other plants being decommissioned (based in particular on an adapted version of the Fessenheim project risk register);
- revised extrapolation coefficients (transposition and mutualisation) for operating purchase costs, based on historical data for the currently active fleet.

Overall, the above factors in the annual cost estimate review had a non-significant impact on provisions for decommissioning of nuclear power plants currently in operation.

Based on the estimates of the different types of cost, the cost to completion (in 2023 euros) amounts to approximately €0.56 billion, for one reactor at Fessenheim, compared to an average cost of €0.42 billion per unit for the entire PWR when the series and mutualisation effects described above are taken into account.

(1) Following an initial survey, 3 major families of equipment to prioritise were identified and are being modernised: lifting equipment, fire detection equipment, and instrumentation and control equipment. A further general study of obsolescence, based on systematic screening of machines and equipment, is in process and will continue in 2024.

For permanently shut-down nuclear power plants

Decommissioning of shut-down reactors involves pilot operations corresponding to four different technologies, each with clear specificities: a PWR reactor at Chooz A located in a cave, UNGG (natural uranium graphite gas-cooled) reactors at Bugey, Saint-Laurent and Chinon, a heavy water reactor at Brennilis, a sodium-cooled fast neutron reactor at Creys-Malville, and the first-of-a-kind second-generation PWR reactor at Fessenheim.

Basis for estimation

The decommissioning costs are based on estimates that take account of accumulated industrial experience, unforeseeable and regulatory developments, and the latest available figures. They have been revised annually since 2015.

The industrial scenario for dismantling of the UNGG reactors was reviewed in depth in late 2015, leading in particular to a switch from “underwater” to “in-air” dismantling, which involves:

- an essentially remote-controlled dismantling process;
- qualification of tools and the remote operation platform on an “industrial demonstrator”, which was inaugurated in 2022;
- dismantling of the initial first-of-a-kind reactor (Chinon A2), and putting the 5 other reactors into a safe storage configuration.

Under this strategy, dismantling operations for the reactor caissons (including the site decontamination and rehabilitation phase) should be completed between 2063 and 2093, depending on the reactors.

Updating the industrial decommissioning scenario for first-generation power plants, particularly UNGG plants, led to a €590 million increase in the provision at 31 December 2015.

From 2016 to 2021:

The amendment made in 2015 to the industrial scenario for dismantling of the UNGG reactors was presented to the ASN’s commissioners on 29 March 2016, and examined by the ASN until 2019. It was reviewed by international experts, examined by the IRSN, and was the subject of three hearings before the ASN’s commissioners, before the ASN issued two decisions dated 3 March 2020. These decisions and the discussions prior to their adoption by the ASN showed that there was convergence on most major technical questions: the dismantling technique (“in-air”), the usefulness of setting up an industrial demonstrator to develop the tools required for these complex operations, the timetable for dismantling the Chinon A2 reactor, and the need to gain experience from operations on a first reactor.

Regarding the timetable of operations, in draft decisions issued for public consultation in 2019, the ASN asked for this work to be brought forward compared to EDF’s proposed schedule, so that dismantling operations on the five reactors after Chinon A2 would begin “no later than 31 December 2055”.

In view of this request for a shorter timescale, the nuclear provisions were increased in 2019 by a total €108 million: €77 million for decommissioning provisions for permanently shut-down nuclear power plants and €31 million for provisions for long-term radioactive waste management (for long-lived low-level waste, very low-level and low and medium-level waste).

The ASN’s decisions concerning dismantling of UNGG reactors were published in March 2020 and did not contradict the principles of the draft decisions of 2019. Consequently, the nuclear provisions for decommissioning of UNGG plants were not subjected to any particular reestimation in 2020, and reflect the best estimate of the industrial and technical scenario.

Finally, in accordance with its powers under Article 594-4 of the Environment Code, in June 2020 the DGEC commissioned an external audit of the estimated cost of dismantling operations for EDF’s permanently shut-down nuclear facilities (the UNGG plants and management of its long-lived low-level waste, Superphenix and Brennilis), conducted by a consortium of specialist firms. This audit took place from December 2020 to July 2021, and the audit report was posted on the Ministry for the Ecological Transition website in November 2021. Its conclusions (confirming the ASN’s observations during its inspection of complex project management, the conclusions of which were released in the first quarter of 2021) highlight “an organisation with a structural focus on execution of dismantling projects”, an “annual estimation and revision process [that] is robust, and provides good traceability for the assumptions used and the original data”, and “a long-term industrial approach to overcome the small number of technological challenges that remain”. Finally, the report states that apart from a non-significant correction (taken into account in the 2021 provisions), “the provisions are coherent with the basic scenarios of the projects and cover the full scope of expenses for the scope audited”, and were found to be of “adequate scale” through testing the scale of EDF’s expenses and provisions.

Developments in 2022

In 2022, following the recommendations made by the DGEC-commissioned audit to confirm scheduling risk assessments and the uncertainty levels concerning estimates, an analytical methodology for assessment of scheduling risks and uncertainties (applied to most of decommissioning projects currently in process) and an additional level of uncertainty for estimates “based on expert assessment” (used in provisions for decommissioning and radioactive waste management) were introduced. This led to an increase of €116 million to decommissioning provisions for permanently shut-down nuclear plants.

The provision for decommissioning of Chooz A was also increased by €37 million to take account of confirmed experience, regarding unforeseen events and delays observed during the dismantling of the reactor vessel (slower segmentation, and unavailability of the bridge crane). As a result of this experience, the vessel dismantling work has been prolonged by 18 months, and a risk of a further 14-month delay on the overall timetable has been identified.

For UNGG plants, the annual review of cost estimates took into consideration delays in obtaining the dismantling decrees (which are now expected in late 2026 rather than late 2025 as previously). This did not have a significant impact on the provisions.

Over a short-term horizon, the provisions take into account expectations that the rises in certain commodity, energy and transport prices will exceed forecast inflation, particularly given the types of purchases relating to decommissioning expenses. This had an impact of €33 million on provisions for decommissioning of permanently shut-down nuclear plants.

Developments in 2023

The annual review in 2023 of the cost estimate for decommissioning of permanently shut-down power plants took into consideration methodological changes regarding the assessment of requirements for research and engineering, the risk of obsolescence in existing equipment that is needed for dismantling (such as maintenance and lifting equipment), and the general application of an analytical method for estimating schedule risks and uncertainties that was already applied in 2022 to most current decommissioning projects. These factors led to an €182 million increase in provisions.

It should also be noted that provisions for decommissioning of permanently shut-down power plants were increased by €41 million to reflect property costs (covering general operation and maintenance of the non-industrial sections of the plants), after the estimate for those costs was updated.

At 31 December 2023, the gross amounts estimated under year-end economic conditions (amounts still to be spent) and the present value of those amounts are as follows, presented by type of reactor technology:

(in millions of euros)	31/12/2023	
	Costs based on year-end economic conditions	Amounts in provisions at present value
Pressurised water reactor - PWR - Chooz A	340	297
Pressurised water reactor - PWR - Fessenheim ⁽¹⁾	994	825
Natural uranium graphite gas-cooled reactors – UNGG – Bugey, Saint Laurent, Chinon	6,172	3,196
Heavy water reactor – Brennilis	392	341
Sodium-cooled fast neutron reactor – Superphenix at Creys Malville	637	561

⁽¹⁾Excluding interim storage and processing of steam generators.

Provisions for decommissioning of permanently shut-down nuclear plants also cover dismantling costs for related facilities such as the APEC Fuel Storage Workshop at Creys-Malville and the BCOT Operational Hot Unit at Tricastin.

Compared to decommissioning costs for the PWR technology, the cost at completion (all costs both settled and remaining) for decommissioning of the other reactors is higher, to different extents depending on their specific characteristics:

- costs are around twice as high for Brennilis (completion cost of approximately €1.0 billion for one reactor) due to its compactness, the fact that the core is encased in concrete and thus difficult to access, the absence of a fuel pool, which complicates remote-controlled segmentation, and the presence of zircaloy (a fire hazard), meaning that segmentation work takes longer and must be more closely supervised;
- costs are around twice as high for UNGG reactors (completion cost of approximately €7.3 billion for six reactors), because they require removal of 20 times more material than a PWR due to their size, and contain graphite which is hard to access and requires special handling such that specific remote-controlled equipment must be developed;
- costs are around four times as high for Superphenix (completion cost of approximately €2.1 billion for one reactor), due to processing of sodium for which elimination is very sensitive, and the size of the facilities, especially the reactor (with a vessel 20 times bigger than the vessel of the 1300MW PWR).

The following progress has been made on permanently shut-down plants:

- Chooz A: the reactor was shut down in 1991 and nuclear dismantling began in 2007 after the dismantling decree was issued. The final stage of dismantling began in 2016 and involves segmentation, conditioning and removal of reactor vessel internals, to be followed by dismantling of the vessel itself. Difficulties were encountered on the site until 2022 (the Covid crisis, unavailability of the bridge crane), but work has now progressed and the reactor building pool was fully emptied by the summer of 2023. Segmentation of the vessel itself will begin in 2025 and end in 2026. A partnership agreement with the French national research agency CNRS was signed on 7 September 2022 for reuse of the caverns for research on neutrinos. Reconfiguration of the cavern is due to be completed in 2033 with a view to transferring it to the CNRS. The plant should be declassified by the end of 2035;
- Fessenheim: the two pressurised water reactors were shut down definitively on 22 February 2020 and 30 June 2020 respectively, in accordance with the law and before the end of their technical operating lifetime. The dismantling plan was sent to the Ecologic Transition Minister and the ASN in December 2020. In early 2022, the *Mission de la Sécurité Nucléaire et de la Radioprotection* (MSNR) and the ASN formally acknowledged reception of an expanded version of this plan. The IRSN issued its opinion on 1 June 2023. Its report does not note any evidence of divergence of technical matters or approach in either the safety demonstration or the impact study. Based on EDF's commitments and the IRSN report, the Permanent Group of experts, at its meeting of 22 June 2023, only made one recommendation: "the Permanent Group of experts recommends that EDF should, before implementing dismantling operations for the vessels and their internals, present a file justifying the technical and organisational design and operation measures chosen to control the risks of dissemination of radioactive substances and exposure of workers to ionising rays associated with these operations". According to the ongoing schedule, the dismantling decree for the Fessenheim installations is expected to be issued in early 2026. Issuance of the decree prescribing the dismantling operations will mark the start of Fessenheim's dismantling phase. At 31 December 2023, progress on the pre-dismantling operations (including full defueling, total chemical decontamination of both primary circuit reactors) was in line with the provisional schedule.

- UNGG reactors: these six reactors were shut down between 1973 and 1994 and received their dismantling decrees between 2008 and 2010 (except for Chinon A1 and A2). Defuelling and circuit draining have been completed for all these reactors, and dismantling operations are in process for the conventional and nuclear buildings in the periphery of the “reactor caissons”. Following the ASN’s decision of 2020, applications for dismantling permits were submitted for all these reactors in December 2022, to obtain new decrees allowing continuation of dismantling operations under an “in-air” strategy (these are expected for the end of 2026 at the earliest). Opening of the top part of the first UNGG reactor caisson – Chinon A2 – is expected in 2034: the initial extractions of vessel internals and graphite blocks are due to start in 2041 and last 14 years. In parallel, the other UNGG sites are finalising work to put the sites into a safe storage configuration (by 2037). A safe storage configuration state means that 80% of surfaces have been dismantled and the reactor caissons are safe while awaiting the full benefit experience on dismantling the caisson of the Chinon A2 first-of-a-kind unit. Opening of subsequent caissons is scheduled to begin from 2056;
- Superphenix: this plant was shut down in 1998 and received its dismantling decree in 2006. The following key stages have been completed: defuelling, dismantling of the turbine hall, drainage of the circuits, processing and elimination of the sodium used for cooling in all circuits, filling the reactor vessel, opening and extracting the vessel caps, and the start of dismantling of the core vessel cap (which weighs several hundred tonnes). The next stages are dismantling the vessel internals (due to be completed in 2026), electromechanical dismantling in the reactor building, then decontamination (the plant is expected to be declassified in 2034);
- Brennilis: this plant was shut down in 1985 and received a partial dismantling decree in 2011 allowing dismantling of all installations peripheral to the “reactor block”. The following key stages have been completed: defuelling, dismantling of the turbine hall, the fuel building, auxiliary buildings, heat exchangers and the effluent treatment station. On 26 September 2023 the Brennilis plant received its “full dismantling” decree allowing work to begin on dismantling the reactor block and demolition of the containment building, with site rehabilitation expected in 2040.

15.1.1.4 Provisions for last cores

These provisions cover the future expenses resulting from scrapping fuel that will only be partially irradiated when the reactor is shut down. They are estimated based on:

- the cost of the loss on fuel in the reactor that is not totally spent at the time of final reactor shutdown and cannot be reused due to technical and regulatory constraints (“front-end” expenses);
- the cost of fuel processing, and waste removal and storage operations (“back-end” expenses). These costs are estimated in a similar way to provisions for spent fuel management and long-term radioactive waste management.

These unavoidable costs are components of the cost of nuclear generating unit shutdown and decommissioning. As such, they are fully covered by provisions from the commissioning date and an asset associated with the provision is recognised. In a decision of 11 December 2020, France’s Council of State challenged the tax-deductibility of the consequences of immediate recognition of a provision for dismantling of the last core (“front-end” last core expenses). In a ruling of 31 March 2023, the Council of State definitively confirmed that this nuclear provision is not tax-deductible (see note 17.3.1).

In 2022, provisions for last cores were adjusted after experience with core management at Fessenheim and its optimisation was finalised. The main consequence was an update to the masses of unused heavy metals included in the calculation of the last core provisions for the entire fleet, resulting in a €(145) million decrease in provisions.

In 2023, provisions for last cores were increased by €103 million after the costs of processing operations were updated (see note 15.1.1.1).

15.1.1.5 Discount rate, inflation and sensitivity analyses

Calculation of the discount rate and inflation rate

The discount rate is based on an interest rate curve, which comprises a sovereign yield curve constructed on year-end market data for liquid horizons (OAT bond 0-20 year curve) and then converging, using an interpolation curve, towards the very long-term rate UFR (Ultimate Forward Rate) - with yields that become close to the UFR after 50 years - plus a curve of the spread of corporate bonds rated A to BBB. Based on the disbursement outflows expected to meet nuclear obligations, a single equivalent discount rate is deduced by applying the discount rates from the interest rate curve constructed in this way to each flow as appropriate to its maturity. This single discount rate is then applied to the forecast disbursement schedules for the costs of the obligations, to determine the provisions.

The UFR was defined by the European Insurance and Occupational Pensions Authority (EIOPA) for very long-term insurance liabilities that will involve disbursements beyond market horizons. The UFR calculated for 2023 (taking into account a 2% inflation rate) is 3.35%. This is used in the calculation methodology, in compliance with the decision by the French authorities, which in the ministerial order of 1 July 2020 amending the order of 21 March 2007 on secure financing of nuclear expenses (see below) changed the formula of the regulatory ceiling for the discount rate, such that it now refers to the UFR instead of the arithmetic 48-month average of the TEC 30-year rate. The UFR is considered more relevant for nuclear provisions in view of the very long-term maturities. The sovereign yield curve at 31 December 2023 indicates rates in a range of [2.2%; 3%] ([2.7%; 3.3%] in 2022) for outflows between 0 and 20 years, ([3%; 3.2%] [3.3%; 3.4%] in 2022) for outflows between 20 and 50 years, and a rate moving towards 3.35% (3.43% in 2022) for outflows after 50 years.

This calculation methodology for the discount rate provides the best assessment of the time value of money with regard to nuclear provisions, which are characterised by very long-term disbursement outflows, well beyond market horizons. This assessment is largely achieved through:

- use of an interest rate curve based on observed year-end market data with liquid horizons, converging over nonliquid horizons towards a very long-term rate with no cycle effect, *i.e.* yield data for all the maturities associated with nuclear provisions;
- use of a very long-term rate (calculated UFR) produced by an independent body and now adopted by the French authorities in setting the formula for the regulatory ceiling, to take account of long trends in yield movements, in coherence with the distant disbursement horizon;
- references to spreads on corporate bonds rated A to BBB by ratings agencies, in order to construct a robust spread curve since there are few AA-rated bonds, particularly on long maturities, whereas most “Investment Grade” bonds are BBB-rated bonds and the great majority of them have longer maturities.

The inflation assumption is based on an inflation curve constructed by reference to inflation-indexed market products and economic forecasts, in long-term coherence with the inflation assumption underlying the UFR (2%).

The discount rate determined is thus 4.5% at 31 December 2023 (4.8% at 31 December 2022), assuming inflation of 2.0% (2.3% at 31 December 2022), *i.e.* a real discount rate of 2.5% at 31 December 2023 (2.5% at 31 December 2022).

The decrease in the discount rate reflects the observed decrease in OAT bond rates at the very end of 2023, and to a lesser degree the narrower corporate bond spreads compared to 31 December 2022, as the markets anticipated the incipient downturn in inflation.

The decrease in the inflation rate assumption reflects the lower inflation forecasts in France. A 2% long-term inflation rate is still used given the ECB’s target level, consistent with the inflation assumption underlying the UFR (Ultimate Forward Rate).

Furthermore, as inflation in 2023 was much higher than long-term inflation and the actual inflation rate consequently exceeded the initial inflation forecast (corresponding to long-term inflation), cost estimates were adjusted to 2023 year-end economic conditions, with a total impact of €801 million on provisions for decommissioning, spent fuel management and waste management.

Regulatory discount rate limit

The discount rate must comply with two regulatory limits. Under the article D594-4 of the Environmental Code and the ministerial order of 1 July 2020 on secure financing for nuclear expenses (which amended the initial ministerial order of 21 March 2007), it must be lower than:

- a regulatory maximum, expressed in real value, *i.e.* net of inflation; this value is equal to the unrounded value representative of expectations concerning the real long-term interest rate, as used for the calculation of the Ultimate Forward Rate (UFR) applicable at the date concerned published by the European Insurance and Occupational Pensions Authority (EIOPA), plus 150bp. In compliance with the ministerial order of 27 December 2023 amending the order of 1 July 2020, this limit is applicable from 2023 (before this order was issued, it was to be calculated under a transitional formula until 2023 and the target formula was only due to apply from 2024);
- and the expected rate of return on assets covering the liability (dedicated assets).

The maximum discount rate calculated by reference to the UFR in application of the order that took effect on 27 December 2023 is 2.85% at 31 December 2023 (2.85% at 31 December 2022).

The real discount rate used in the financial statements at 31 December 2023, calculated by the method presented above, is 2.5%.

Analyses of sensitivity to macro-economic assumptions

Sensitivity to assumptions concerning costs, inflation rate, long-term discount rate, and disbursement schedules can be estimated through comparison of the gross amount estimated under year-end economic conditions with the present value of the amount.

Provisions related to nuclear generation within the scope of the Law of 28 June 2006

	31/12/2023		31/12/2022	
	Costs based on year-end economic conditions	Amounts in provisions at present value	Costs based on year-end economic conditions	Amounts in provisions at present value
(in millions of euros)				
Spent fuel management	18,998	12,657	16,194	10,184
- amount unrelated to the operating cycle	3,658	1,760	3,417	1,607
Long-term radioactive waste management	38,467	13,205	36,996	12,475
BACK-END NUCLEAR CYCLE EXPENSES	57,465	25,862	53,190	22,659
Decommissioning of nuclear plants in operation	23,335	13,002	21,381	12,125
Decommissioning of shut-down nuclear plants	8,832	5,417	8,219	4,969
Last cores	4,668	2,720	4,189	2,434
DECOMMISSIONING AND LAST CORE EXPENSES	36,835	21,139	33,789	19,528
PROVISIONS RELATED TO NUCLEAR GENERATION within the scope of the law of 28 June 2006	-	47,001		42,187

The cumulative disbursements of nuclear expenses (based on gross values at year-end economic conditions) are distributed as follows:

Provisions related to nuclear generation within the scope of the Law of 28 June 2006

	31/12/2023		
	Costs based on year-end economic conditions		
(in millions of euros)	Disbursement expected within 10 years	Disbursement expected after 10 years ⁽¹⁾	Total
Spent fuel management	10,117	8,881	18,998
- amount unrelated to the operating cycle	611	3,047	3,658
Long-term radioactive waste management	5,633	32,834	38,467
BACK-END NUCLEAR CYCLE EXPENSES	15,750	41,715	57,465
Decommissioning of nuclear plants in operation	483	22,852	23,335
Decommissioning of shut-down nuclear plants	3,503	5,329	8,832
Last cores	722	3,946	4,668
DECOMMISSIONING AND LAST CORE EXPENSES	4,708	32,127	36,835

⁽¹⁾Over a 20-year and 50-year horizon, 22% and 43% respectively of cumulative disbursements (at year-end economic conditions) will concern long-term radioactive waste management provisions, and 35% and 96% respectively will concern decommissioning provisions.

For additional information, the table below shows the estimated impact of a +/-20bp change in the discount rate on the present value of provisions for the back-end of the nuclear cycle, decommissioning of nuclear plants and last cores:

At 31 December 2023

(in millions of euros)	Amounts in provisions at present value	Sensitivity to discount rate			
		Balance sheet provisions		Pre-tax net income	
		+ 0.20%	- 0.20%	+ 0.20%	- 0.20 %
Back-end nuclear cycle expenses:					
- spent fuel management	13,876	(232)	246	194	(206)
- long-term radioactive waste management	13,205	(722)	810	565	(642)
Decommissioning and last core expenses:					
- decommissioning of nuclear plants in operation	13,002	(571)	601	-	-
- decommissioning of shut-down nuclear plants	5,417	(163)	174	163	(174)
- last cores	2,720	(93)	99	-	-
TOTAL	48,220	(1,781)	1,930	922	(1,022)
<i>Amount covered by dedicated assets</i>	<i>33,989</i>	<i>(1,571)</i>	<i>1,710</i>	<i>801</i>	<i>(895)</i>

The impact of a +/-10 base point variation in discount rates on the present value of provisions for the back-end of the nuclear cycle, decommissioning and last cores is estimated at €(908)/945 million, including €473/(497) million on the pre-tax net income.

15.1.2 EDF's dedicated assets

15.1.2.1 Regulations

Articles L. 594-1 and following of France's Environment Code and their implementing regulations require assets (dedicated assets) to be set aside for secure financing of nuclear plant decommissioning expenses and long-term storage expenses for radioactive waste. These regulations govern the way dedicated assets are built up, and the management and governance of the funds themselves. Dedicated assets are clearly identified and managed separately from the Company's other financial assets and investments. They are also subject to specific monitoring and control by the Board of Directors and the administrative authorities.

The law requires the realisable value of dedicated assets to be higher than the value of the provisions corresponding to the present value of the long-term nuclear expenses defined in France's Environment Code.

The Decree of 1 July 2020 codified the regulatory obligations concerning dedicated assets in articles D594-1 and following of the Environment Code, complemented by the ministerial order of 21 March 2007 amended by the order of 1 July 2020.

The decree of 22 November 2023 updated the rules for investing in dedicated assets. It set certain limits depending on disbursement schedules, and introduced new rules regarding concentration risks. In particular, the shares of CTE, the entity that has held 100% of the capital of RTE since 31 December 2017 (see note 15.1.2.2 below), are no longer subject to any specific restriction. This decree also broadens the options for investing in unlisted assets, such that the ministerial authorisation granted on 31 May 2018 allowing EDF to increase the portion of unlisted assets in its dedicated assets from 10% to 15% subject to conditions is no longer relevant.

Since the decree of 1 July 2020, EDF is no longer obliged to add to dedicated assets when the coverage rate of obligations, determined by the ratio of the assets' realisable value to the amount of the provisions concerned, is above 100%, and withdrawals from assets are not authorised unless that rate is above 120%. The decree also increased the maximum period for allocating funds to dedicated assets in the event of undercoverage, subject to authorisation by the administrative authority, to 5 years (instead of 3 years previously).

15.1.2.2 Strategic allocation and composition of dedicated assets

Given the regulations governing dedicated assets, they form a highly specific category of assets.

Dedicated assets are structured and managed according to a strategic allocation defined by the Board of Directors and reported to the administrative authorities. The strategic allocation is designed to meet the overall objective of long-term coverage of obligations, and determines the structure and management of the portfolio as a whole. It takes into account regulatory constraints concerning the nature and liquidity of the dedicated assets, the financial outlook for the equity and bond markets, and the diversifying contribution of unlisted assets.

Several changes have been made to this strategic allocation in order to pursue the diversification into unlisted assets, particularly in 2010 when the shares in RTE (now held via CTE) were allocated to dedicated assets, and in 2013 when an unlisted asset portfolio (consisting of infrastructures, real estate and debt or equity funds) was set up. This portfolio is managed by EDF SA's "EDF Invest" Division.

On 29 June 2018 the Board of Directors validated the principle of strategic allocation for dedicated assets:

- yield assets (target of 30% of dedicated assets), consisting of infrastructure assets, including the shares of CTE, and real estate property;
- growth assets (target of 40% of dedicated assets), consisting of equity funds investing in listed or unlisted equities;
- fixed-income assets (target of 30% of dedicated assets), consisting of listed bonds or listed bond funds, unlisted debt funds, receivables and cash.

These targets should be reached gradually by 2025.

EDF Invest manages yield assets, but through unlisted investment funds it also manages growth and fixed-income assets.

At 31 December 2023 the total realisable value of assets managed by EDF Invest is €9,482 million, including €8,657 million for yield assets.

Yield assets

The yield assets consist mainly of assets related to investments in infrastructures and real estate, made either directly or by investment funds under delegated management arrangements.

Yield assets particularly include:

- the Group's investments in CTE, Madrileña Red de Gas (MRG), *Aéroports de la Côte d'Azur*, Orange Concessions, Energy Assets Group, Nam Theun Power Company, companies that own wind and solar power plants (in the United States, Canada, and the United Kingdom) and companies that own real estate assets (Central Sicaf, Ecowest, Clariane & Partenaires Immobilier, Issy Shift, 92 France, and LF Memphis), presented in investments in associates in the consolidated balance sheet;
- the Group's investments in Teréga, Porterbrook, Autostrade per l'Italia, Q-Park, Géosel, Norlys Fiber, Databank and companies that own wind farms in the United Kingdom, presented in debt and equity securities in the consolidated balance sheet.

Growth assets and fixed-income assets

Certain growth and fixed-income assets take the form of bonds held directly by EDF. Others consist of specialised collective investment funds on leading international markets and French general-purpose investment funds (FIVGs), managed by independent asset management companies. They take the form of open-end funds and "reserved" funds located in France, established for the company. The reserved funds are owned by EDF and are not consolidated as EDF does not participate in management of these funds and provides no financial support for them.

The value of the assets of the reserved investment funds amounts to €14,579 million at 31 December 2023 (€12,192 million at 31 December 2022). These funds mainly consist of 18 listed funds with total value of €13,298 million (at 31 December 2022, 17 listed funds with total value of €11,000 million).

The listed equity funds consist of international equities (mainly in North America but also in Europe, Asia-Pacific and emerging countries). Listed bonds and listed bond funds consist of sovereign and corporate bonds.

These investments are structured and managed in line with the strategic allocation, which takes into consideration international stock market cycles, for which the statistical inversion generally observed between equity market cycles and bond market cycles – as well as between geographical areas – has led the Group to define a long-term investment policy with appropriate allocation between growth assets and fixed-income assets.

Growth assets also include a small portion of funds invested in unlisted equities, and fixed-income assets also include a small portion of funds invested in unlisted debt. These funds are mainly managed by EDF Invest.

At the year-end, dedicated assets are presented in debt and equity securities in the balance sheet, at their liquidation value.

In the course of operational asset monitoring, the Group applies long-term, specific management rules defined and supervised by its governance bodies (maximum investment ratios, volatility analyses and assessment of individual fund manager quality).

15.1.2.3 Changes in dedicated assets in 2023

High-risk assets recovered in 2023, partly making up for the ground lost in 2022 due to a favourable economic environment: in the United States particularly, economic growth was very resilient despite tougher financial conditions, and most importantly, the rapid ebb in inflation allowed the central banks to put an end to the cycle of quantitative tightening.

Despite the decline in interest rates observed at the end of the year, equity and bond performances were excellent in 2023.

The listed equities portfolio grew by 18.43% in 2023. In detail, the net performance in euros was 22.69% on North American equities, 14.38% in Europe, 19.20% in Japan and 5.22% in emerging countries.

The bond portfolio grew by more than 8.59% in 2023 despite significantly fluctuating interest rates. The portfolio benefited from tactical management of interest rate sensitivity, and good performances by credit in general. The sovereign bond portfolio registered growth of 8.02%, the Euro investment grade credit portfolio achieved 9.04%, and the short-term high-yield credit portfolio 6.54%.

Positive changes in the fair value of the dedicated asset portfolio (investment funds, equities) amounting to +€2,220 million were recognised in the financial result in 2023 (see note 8.3), compared to negative changes amounting to €(3,096) million in 2022. Positive changes in the fair value of the bonds in the dedicated asset portfolio amounting to +€431 million were also recognised in OCI in 2023 (see note 18.1.2), compared to negative changes amounting to €(875) million in 2022.

EDF Invest continued to extend its portfolio of unlisted assets in 2023, purchasing minority stakes in infrastructures and real estate (logistics, offices), and investing in private equity and private debt funds.

In the second half of 2023, EDF Invest acquired 50% of the Memphis office building in Paris (see the Group press release of 20 December 2023) and completed the purchase of a 50% share of logistics warehouses in Sweden (Nordic Logistic) on 31 January 2024. In October 2023, EDF Invest signed an agreement as part of a consortium to acquire a stake in the Norwegian electric ferry operator Fjord1. This transport infrastructure investment was completed on 8 February 2024.

Withdrawals from dedicated assets in 2023 totalled €465 million, equivalent to payments made in respect of the long-term nuclear obligations to be covered during the year (€416 million in 2022).

15.1.2.4 Valuation of EDF's dedicated assets

EDF's dedicated assets are included in the Group's consolidated financial statements at the following values:

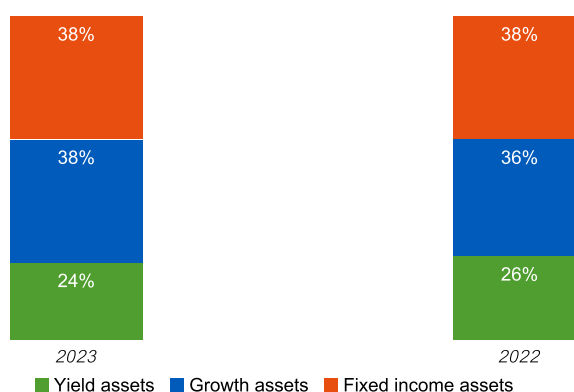
(in millions of euros)		31/12/2023		31/12/2022	
		Book value	Realisable value	Book value	Realisable value
YIELD ASSETS (EDF Invest)⁽¹⁾		6,196	8,657	6,477	8,772
Other associates (including CTE)	Investments in associates ⁽¹⁾ and ⁽²⁾	3,834	6,287	4,034	6,286
Other unlisted assets	Debt and equity securities and other net assets ⁽³⁾	2,359	2,367	2,422	2,465
Derivatives	Fair value of derivatives	3	3	21	21
GROWTH ASSETS (EDF INVEST)		14,036	14,036	12,251	12,251
Equities (investment funds)	Debt securities	13,392	13,392	11,625	11,625
Unlisted equity funds (EDF Invest)	Debt securities	589	589	553	553
Derivatives	Fair value of derivatives	55	55	73	73
FIXED-INCOME ASSETS (EDF Invest)		14,192	14,192	12,881	12,881
Bonds and negotiable debt instruments	Debt securities	12,488	12,488	11,101	11,101
Unlisted debt funds (EDF Invest)	Debt securities	236	236	215	215
Cash portfolio	Debt securities	1,104	1,104	1,414	1,414
Diversified debt funds	Debt securities	363	363	163	163
Derivatives	Fair value of derivatives	1	1	(12)	(12)
TOTAL DEDICATED ASSETS		34,424	36,885	31,609	33,904

⁽¹⁾ Including 50.1% of CTE, the company that holds 100% of the shares in RTE (see note 12). The realisable value of EDF Invest in the above table has been determined by an independent assessor.

⁽²⁾ Including the value of the share in equity of the controlled companies owning these investments.

⁽³⁾ Including debt and equity securities amounting to €2,238 million and the value of the share in equity of other controlled companies.

The structure of the dedicated asset portfolio in 2023 and 2022 is as follows (in realisable value):



15.1.3 Coverage of EDF's long-term nuclear obligations

The Group's long-term nuclear obligations in France concerned by the regulations for dedicated assets related to nuclear generation are included in the EDF group's consolidated financial statements at the following values:

(in millions of euros)	31/12/2023	31/12/2022
Provisions for spent fuel management – portion unrelated to the operating cycle as defined in the regulations	1,760	1,607
Provisions for long-term radioactive waste management	13,205	12,475
Provisions for nuclear plant decommissioning	18,419	17,094
Provisions for last cores – portion for future long-term radioactive waste management	605	473
PRESENT COST OF LONG-TERM NUCLEAR OBLIGATIONS	33,989	31,649
REALISABLE VALUE OF DEDICATED ASSETS	36,885	33,904
REGULATORY COVERAGE RATE	108.5%	107.1%

At 31 December 2023, by the regulatory calculations provisions are 108.5% covered by dedicated assets. The potential regulatory caps on the realisable value of certain investments set in the Environment Code were not applicable at 31 December 2023.

As the coverage of provisions by dedicated assets was above 100%, EDF had no obligation to add to the dedicated asset portfolio in 2023 and no allocation was made during the year.

At 31 December 2022, by the regulatory calculations provisions were 107.1% covered by dedicated assets (and the regulatory caps were again not applicable). No allocation to dedicated assets was made in 2022.

15.2 EDF Energy's nuclear provisions

The specific financing terms for long-term nuclear commitments related to EDF Energy are reflected as follows in the EDF group's financial statements:

- the obligations are reported in liabilities in the form of provisions amounting to €14,365 million at 31 December 2023;
- in the assets, EDF Energy reports receivables corresponding to the amounts payable under the restructuring agreements by the Nuclear Liabilities Fund (NLF), for non-contracted obligations or decommissioning obligations, and by the British Government for contracted obligations (or historical liabilities).

These receivables are discounted at the same real rate as the obligations they are intended to finance. They are included in "Financial assets" in the consolidated balance sheet (see note 18.1.3) at the amount of €13,104 million at 31 December 2023 (€14,000 million at 31 December 2022).

Details of changes in provisions for the back-end of the nuclear cycle and provisions for decommissioning and last cores are as follows:

(in millions of euros)	31/12/2022	Increases	Decreases	Discount effect	Translation adjustments	Other movements	31/12/2023
Provisions for spent fuel management	1,284	15	(137)	96	26	(46)	1,238
Provisions for waste removal and conditioning	373	-	-	25	8	-	406
Provisions for long-term radioactive waste management	1,066	2	-	71	22	12	1,173
Provisions for the back-end of the nuclear cycle	2,723	17	(137)	192	56	(34)	2,817
Provisions for nuclear plant decommissioning	11,296	-	(659)	753	231	(1,344)	10,277
Provisions for last core	1,129	-	-	61	23	58	1,271
Provisions for decommissioning and last cores	12,425	-	(659)	814	254	(1,286)	11,548
PROVISIONS RELATED TO NUCLEAR GENERATION	15,148	17	(796)	1,006	310	(1,320)	14,365

"Other movements" include the changes in nuclear liabilities with a corresponding adjustment in the amount of reimbursements receivable from the NLF and the British government, and the change in the provision for last cores *via* an adjustment to fixed assets.

The overall change in "other movements" is mainly due to:

- an update of the costs estimates based on the Integration plan 24 (IP 24) approved by the Non-Nuclear Liabilities Assurance team (NLA) in December 2023 and a release of the provision following cost underspend within the year (including costs directly related to market prices which have since fallen since IP 23) resulting in a decrease of the provisions for the backend of the cycle and decommissioning for an amount of €(664) million;

- an increase in the real discount rate in the United Kingdom (particularly +20 base point on provisions for the backend of the cycle and decommissioning), resulting in a decrease of the provisions for an amount of €(406) million;
- the new assumptions regarding the closure of Heysham 1 and Hartlepool AGR plants, scheduled for 2026 (previously 2024), resulting in a decrease of the provisions for the backend of the cycle and decommissioning for an amount of €(245) million.

15.2.1 Regulatory and contractual framework

Amendments signed with the Nuclear Liabilities Fund (NLF – an independent trust set up by the UK Government as part of the restructuring of British Energy) following the EDF group's acquisition of British Energy had a limited impact on the contractual financing commitments made to British Energy by the UK Secretary of State and the NLF under the "Restructuring Agreements". These agreements were entered into by British Energy on 14 January 2005 as part of the restructuring led by the UK Government in order to stabilise British Energy's financial position. These agreements were amended and restated on 5 January 2009 as part of the acquisition of the British Energy Generation Limited by the Group. British Energy Generation Limited changed its name to EDF Energy Nuclear Generation Limited on 1 July 2011 and replaced British Energy in these agreements and amendments.

Under the terms of the Restructuring Agreements:

- the NLF agreed to fund, to the extent of its assets: (i) qualifying contingent and/or latent nuclear liabilities (including liabilities for management of spent fuel from the Sizewell B power station); and (ii) qualifying decommissioning costs for EDF Energy's existing nuclear power stations;
- the Secretary of State agreed to fund: (i) qualifying contingent and/or latent nuclear liabilities (including liabilities for the management of spent fuel from the Sizewell B power station) and qualifying decommissioning costs related to EDF Energy's existing nuclear power stations, to the extent that they exceed the assets of the NLF; and (ii) subject to a cap of £2,185 million (in December 2002 monetary values, adjusted accordingly), qualifying known existing liabilities for EDF Energy's spent fuel (including liabilities for management of spent fuel from plants other than Sizewell B loaded in reactors prior to 15 January 2005);
- EDF Energy is responsible for funding certain excluded or disqualified liabilities (e.g. those defined as EDF Energy liabilities), and additional liabilities which could be created as a result of failure by EDF Energy to meet minimum performance standards under applicable law. The obligations of EDF Energy to the NLF and the Secretary of State are guaranteed by the assets of the principal members of EDF Energy.

EDF Energy also made commitments to pay:

- annual decommissioning contributions for a period limited to the useful life of the plants as at the date of the "restructuring agreements"; the corresponding provision amounts to €82 million at 31 December 2023;
- £150,000 (indexed to inflation) per tonne of uranium loaded in the Sizewell B reactor after the date of the "restructuring agreements".

Furthermore, EDF Energy entered into a separate contract with the Nuclear Decommissioning Authority (NDA) for management of AGR spent fuel and associated radioactive waste resulting from operation of power plants other than Sizewell B after 15 January 2005, and bears no responsibility for this fuel and waste once it is transferred to the processing site at Sellafield. The corresponding costs of £150,000 (indexed to inflation) per tonne of loaded uranium – plus a rebate or surcharge dependent on market electricity price and electricity generated in the year – are included in inventories.

On 23 June 2021 EDF and the UK government signed an update to the Restructuring Agreements. The changes and clarifications to the Agreements confirm the recovery of qualifying costs and stipulate that once the AGR stations have finished defueling under EDF Energy responsibility, they will transfer to the NDA which will be responsible for subsequent decommissioning activities. These amended agreements had no consequences in the Group financial statements at 31 December 2023.

On an annual basis the cost estimates which form the basis of EDF Energy's Back End Nuclear Cycle and Nuclear Plants Decommissioning provision are updated based on Integrated Plan (IP) assumptions. The IP is submitted to the NLA for approval. The IP23 and the IP24 were approved by the NLA respectively in December 2022 and in December 2023.

15.2.2 Provisions for the back-end of the nuclear cycle

Spent fuel from the Sizewell B PWR (pressurised water reactor) plant is stored on site. Spent fuel from the AGR plants is transferred to Sellafield for storage and reprocessing.

EDF Energy's provisions for the back-end of the nuclear cycle concern obligations for reprocessing and storage of spent fuel and long-term storage of radioactive waste, required by the existing regulations in the UK approved by the Nuclear Decommissioning Authority (NDA). Their amount is based on contractual agreements or if this is not possible, on the most recent technical estimates.

(in millions of euros)	31/12/2023		31/12/2022	
	Costs based on year-end economic conditions ⁽¹⁾	Amounts in provisions at present value	Costs based on year-end economic conditions ⁽¹⁾	Amounts in provisions at present value
Spent fuel management	3,790	1,238	3,695	1,284
Waste removal and conditioning	2,071	406	1,867	373
Long-term radioactive waste management	5,784	1,173	5,158	1,066
BACK-END NUCLEAR CYCLE EXPENSES	11,645	2,817	10,720	2,723

⁽¹⁾ The costs based on year-end economic conditions include spent fuel and associated waste management over the operating life of the reactors (including future load fuel for Sizewell B only); the provisions are based on the fuel committed to date.

15.2.3 Provisions for nuclear plant decommissioning

Provisions for decommissioning of nuclear plants cover the full cost of decommissioning and are measured on the basis of existing techniques and methods that are most likely to be used for application of current regulations.

As explained above, the Restructuring Agreements updated in June 2021 provide that once the AGR power plants have finished defueling that they will transfer to the NDA for subsequent decommissioning activities.

The signature of these agreements has no immediate accounting consequences for decommissioning provisions or the receivable representing reimbursements to be made by the NLF and the UK government. Nuclear decommissioning liabilities and the associated assets will be derecognised during the agreement's operational implementation phase.

(in millions of euros)	31/12/2023		31/12/2022	
	Costs based on year-end economic conditions	Amounts in provisions at present value	Costs based on year-end economic conditions	Amounts in provisions at present value
PLANT DECOMMISSIONING EXPENSES	20,459	10,195	20,875	11,206

15.2.4 Discounting of EDF Energy's provisions related to nuclear generation

The method used to determine the discount rate is the following:

- Like the discount rate for nuclear provisions in France, the discount rate for EDF Energy's provisions is based on an interest rate curve, which comprises a sovereign yield curve constructed on year-end market data for liquid horizons (UK gilt 0-20 year yield) and then converging, using an interpolation curve, towards the very long-term rate UFR (Ultimate Forward Rate) plus a curve of the spread of corporate bonds rated A to BBB. Based on expected disbursements corresponding to nuclear obligations, a single equivalent discount rate is deduced from the curve constructed in this way. This single discount rate is then applied to the forecast disbursement schedules for the costs of the obligations, to determine the provisions;
- The inflation assumption is based on an inflation curve constructed by reference to economic forecasts and inflation-indexed market products, in long-term coherence with the inflation assumption underlying the UFR (2%).

As a consequence, the real discount rate used to calculate provisions for the back-end of the nuclear cycle and decommissioning of nuclear plants is 3.1% (2.9% as at 31 December 2022).

15.3 Nuclear provisions in Belgium

In Belgium, the law of 11 April 2003 assigned management of provisions concerning the Belgian nuclear plants, and the funds that cover them, to Synatom (a subsidiary of the ENGIE group). Luminus contributes *via* Synatom to these funds, to cover its share of plant decommissioning and back-end nuclear fuel expenses as a co-owner of 4 nuclear plants. These funding mechanisms are reflected through the following items in the consolidated financial statements:

- provisions, amounting to €352 million at 31 December 2023 (€377 million at 31 December 2022);
- a receivable representing the advance payments made to Synatom, recognised as financial assets carried at fair value (see note 18.1.3) at the value of €298 million at 31 December 2023 (€253 million at 31 December 2022). This receivable, which corresponds to the fair value of the share of funds held by Synatom on behalf of Luminus, is reported at present value in Luminus' financial statements, applying the same real discount rate used to determine the obligations these funds will cover.

Other provisions related to nuclear generation in Belgium correspond to provisions that are not part of the mechanisms described above.

At 31 December 2023, nuclear provisions in Belgium include an increase of €367 million mainly resulting from the final agreement between Engie and the Belgian State on 13 December 2023 on all the nuclear waste-related obligations for Luminus and EDF Belgium (the agreement defines a fixed amount for future nuclear waste processing costs), and extension of the operating lifetimes of Tihange 3 and Doel 4.

Note 16 Provisions for employee benefits

ACCOUNTING PRINCIPLES AND METHODS

The Group grants its employees post-employment benefits (pension plans, retirement indemnities, etc.) and other long-term benefits (e.g. long-service awards) in compliance with the specific laws and measures in force in each country where it does business.

CALCULATION AND RECOGNITION OF EMPLOYEE BENEFIT OBLIGATIONS

Obligations under defined-benefit plans are calculated by the projected unit credit method, which determines the present value of entitlements earned by employees at year-end under all types of plan, taking into consideration the prospects for wage increases and each country's specific economic conditions.

Post-employment benefit obligations are valued mainly using the following methods and assumptions:

- retirement age, determined on the basis of the applicable rules for each plan, and the requirements to qualify for a full pension;
- career-end salary levels, with reference to employee seniority, projected salary levels at the time of retirement based on the expected effects of career advancement, and estimated trends in pension levels;
- forecast numbers of pensioners, determined based on employee turnover rates and mortality data available in each country;
- reversion pensions where relevant, taking into account both the life expectancy of the employee and his/her spouse and the marriage rate;
- a discount rate that depends on the geographical zone and the duration of the obligations, determined at the year-end date by reference to the market yield on high-quality corporate bonds or the rate on government bonds whose duration is coherent with EDF group's commitments to employees.

The amount of the provision corresponds to the value of obligations less the fair value of the fund assets that cover those obligations.

The net expense booked during the year for employee benefit obligations includes:

- in the income statement:
 - the current service cost, corresponding to additional benefit entitlements earned during the year,
 - the net interest expense, corresponding to interest on obligations net of the return on fund assets, which is calculated using the same discount rate as for the obligations,
 - the past service cost, including the income or expense related to amendments or settlements of benefit plans or introduction of new plans,
 - the actuarial gains and losses relating to other long-term benefits;
- in other components of consolidated comprehensive income:
 - the actuarial gains and losses relating to post-employment benefits and any return on hedging assets in excess of the discount rates used,
 - the effect of the limitation to the asset ceiling if any.

POST-EMPLOYMENT BENEFIT OBLIGATIONS

When they retire, Group employees benefit from pensions determined under local rules. They may also be entitled to benefits directly paid by the companies, and additional benefits prescribed by the relevant regulations.

French entities covered by the IEG system

Entities belonging to the specific IEG (electricity and gas sector) system, namely EDF, Enedis, Électricité de Strasbourg and EDF PEI, are Group companies where almost all employees benefit from the IEG statutes, including statutory benefits and, for employees hired before 1 September 2023, the special IEG pension system.

After the financing reform for the IEG system took effect on 1 January 2005 (law of 9 August 2004), pension provisions were recognised by IEG companies to cover entitlements not funded by France's standard systems (CNAV, AGIRC and ARRCO), to which the IEG system is affiliated, or by the CTA (*Contribution Tarifaire d'Acheminement*) levy on gas and electricity transmission and distribution services.

As a result of the system affiliation mechanism, any change (whether favourable or unfavourable to employees) in the standard French pension system that is not passed on to the IEG pension system is likely to cause a variation in the amount of the provisions recorded by the Group to cover its obligations.

The obligations concerned by the pensions and for which a provision is recorded thus include:

- specific benefits of employees in the deregulated or competitive activities;
- specific benefits earned by employees from 1 January 2005 for the regulated activities (transmission and distribution) (benefits earned prior to that date are financed by the CTA levy).

Under the pension reform law of 14 April 2023, the special IEG pension system has been discontinued for employees joining the sector from 1 September 2023. These employees will be affiliated to the standard French pension plans (CNAV, AGIRC-ARRCO) but will still be entitled to other benefits associated with IEG status (energy at preferential prices, family benefits, etc) (see note 16.1.2 for further details of the reform and its effects on the Group's financial statements at 31 December 2023).

In addition to pensions, other benefits are granted to retired IEG status employees (including those hired from 1 September 2023), as detailed below:

- benefits in kind (energy): Article 28 of the IEG national statutes entitles such employees and current employees to benefits in kind in the form of supplies of electricity or gas at preferential prices. The obligation for supplies of energy to employees of the EDF and ENGIE groups corresponds to the probable present value of kWh to be supplied to beneficiaries or their dependants during their retirement, valued on the basis of the unit cost (which mainly depends on the marginal production cost and taxes). It also includes the balancing payment made under the energy exchange agreement with ENGIE;
- retirement gratuities: these are paid upon retirement to employees due to receive the statutory old-age pension, or to their dependants if the employee dies before reaching retirement. These obligations are almost totally covered by an insurance policy;
- bereavement benefit: this is paid out upon the death of an inactive or disabled employee, in order to provide financial assistance for the expenses incurred at such a time (Article 26 - § 5 of the National Statutes). It is paid to the deceased's principal dependants (statutory indemnity equal to three months' pension, subject to a ceiling) or to a third party that has paid funeral costs (discretionary indemnity equal to the costs incurred);
- bonus pre-retirement paid leave: all employees eligible to benefit immediately from the statutory old-age pension and aged at least 55 at their retirement date are entitled to 18 days of bonus paid leave during the last twelve months of their employment;
- other benefits include help with the cost of studies, time banking for pre-retirement leave, and pensions for personnel sent on secondment to subsidiaries not covered by the IEG system.

EDF Energy

Regarding pension obligations in the United Kingdom, EDF Energy's three defined-benefit plans (BEGG (British Energy Generation Group), EEGSG (EDF Energy Generation and Supply Group), and EEPS (EDF Energy Pension Scheme)) were closed at 31 December 2021, and replaced by a new defined-contribution plan called "myRetirement Plan". The rights vested under the previous plans up to their closing date still exist, and the corresponding obligations are update for changes in discount and inflation rates, but are no longer affected by new members or wage increases. Meanwhile, the closed plans were merged into a single plan called "EDF group of the Electricity Supply Pension Scheme (ESPS)" (EDFG).

OTHER LONG-TERM BENEFIT OBLIGATIONS

These benefits concern employees currently in service, and are earned according to local regulations, particularly the statutory regulations for the electricity and gas sector for EDF and French subsidiaries covered by the IEG regime. They include:

- annuities following incapacity, invalidity, industrial accident or work-related illness;
- long-service awards;
- specific benefits for employees who have been in contact with asbestos.

16.1 Group provisions for employee benefits

(in millions of euros)

	31/12/2023	31/12/2022
Provisions for employee benefits – current portion	665	790
Provisions for employee benefits – non-current portion	15,895	16,231
PROVISIONS FOR EMPLOYEE BENEFITS	16,560	17,021

16.1.1 Change in the provision by geographical area: obligations, fund assets, net liability

(in millions of euros)

	France ⁽¹⁾	United Kingdom	Other	Total
Obligations at 31/12/2022	26,054	6,401	775	33,230
Net expense for 2023	1,850	222	54	2,126
Actuarial gains and losses	(509)	470	30	(9)
Employees' contributions to funds	-	1	-	1
Benefits paid	(1,208)	(315)	(39)	(1,562)
Changes in scope of consolidation	-	-	6	6
Translation adjustment	-	134	(2)	132
Other movements	-	-	(2)	(2)
OBLIGATIONS AT 31/12/2023	26,187	6,913	822	33,922

(in millions of euros)

	France ⁽¹⁾	United Kingdom	Other	Total
Fund assets at 31/12/2022	(9,398)	(7,039)	(447)	(16,884)
Net expense for 2023	(357)	(336)	(15)	(708)
Actuarial gains and losses	(652)	259	(11)	(404)
Employer's contributions to funds	(35)	(78)	(20)	(133)
Employees' contributions to funds	-	(1)	-	(1)
Benefits paid	441	315	16	772
Translation adjustment	-	(153)	8	(145)
Changes in scope of consolidation	-	-	(3)	(3)
Other movements	-	-	2	2
FUND ASSETS AT 31/12/2023	(10,001)	(7,033)	(470)	(17,504)

(in millions of euros)

	France ⁽¹⁾	United Kingdom	Other	Total
Net employee benefit liability at 31/12/2022⁽²⁾	16,656	(638)	328	16,346
Net expense for 2023	1,493	(114)	39	1,418
Actuarial gains and losses	(1,161)	729	19	(413)
Employer's contributions to funds	(35)	(78)	(20)	(133)
Benefits paid	(767)	-	(23)	(790)
Changes in scope of consolidation	-	-	3	3
Translation adjustment	-	(19)	6	(13)
Other movements	-	-	-	-
NET EMPLOYEE BENEFIT LIABILITY AT 31/12/2023	16,186	(120)	352	16,418
Including:				
Provisions for employee benefits				16,560
Non-current financial assets ⁽²⁾				(142)

⁽¹⁾ France comprises the two operating segments "France – Generation and Supply" and "France – Regulated activities" (see note 16.2).

⁽²⁾ The net liability at 31 December 2022 comprised €17,021 million for the provisions for employee benefits and €(675) million of non-current financial assets, giving a net liability amount of €16,346 million.

Actuarial gains and losses on obligations

Actuarial gains and losses on obligations amount to €(9) million for 2023, including:

- €(509) million in France as a result of:
 - the €2,037 million change in the discount rate,
 - the €(1,165) million change in the inflation rate,
 - the €(1,382) million change in experience adjustments; and
- €470 million in the United Kingdom, essentially associated with changes in the discount and inflation rates (€306 million), demographic assumptions (€(119) million) and experience adjustments (€284 million) (see note 16.1.3).

Actuarial gains and losses on obligations amount to €(12,789) million for 2022, including:

- €(9,260) million in France as a result of:
 - the €(16,997) million change in the discount rate,
 - the €(145) million change in demographic assumptions,
 - the €5,045 million change in the inflation rate,
 - the €2,276 million impact of pay rise measures decided in 2022 for application from January 2023,
 - the €561 million change in experience adjustments; and
- €(3,386) million in the United Kingdom, essentially associated with changes in the discount and inflation rates (€(4,475) million) and experience adjustments (€1,257 million) (see note 16.1.3).

Actuarial gains and losses on fund assets in 2023

Actuarial gains and losses on fund assets amount to €(404) million for 2023. They mainly result from a €(652) million change in France (outperforming the expected return on fund assets by 6.9%) due to a decrease in discount rates at the end of the year and a good equity market performance, and a €259 million change in the United Kingdom where the return on fund assets, principally bonds, was lower than the discount rate.

Net employee benefit liability at 31 December 2023

The net liability at 31 December 2023 amounted to €16,418 million, including:

- €16,186 million in France;
- €(120) million in the United Kingdom, reflecting recognition by EDF Energy of surplus funding on its EDFG pension scheme, totalling €134 million compared to €638 million at 31 December 2022. This surplus funding, which has decreased primarily due to lower yields on private company bonds in the United Kingdom compared to the 2022 year-end, is recognised in balance sheet assets under "non-current financial assets".

16.1.2 Pension reform in France

French law 2023-270 amending social security funding for 2023, adopted on 14 April 2023, introduced changes to France's general pension system. The principal measures are a gradual rise in the standard retirement age from 62 to 64, and an increase in the contribution period required to qualify for a full pension.

The implementation decree 2023-692 concerning employees affiliated to the special IEG (electricity and gas sector) regime was published on 28 July 2023. The parametric rules defined in this decree will be applicable from 1 January 2025 for employees born in or after 1963 (whereas the measures of the law applicable to the standard national pension system came into force from 1 September 2023 and apply to employees born in or after 1961).

The new law also discontinues the special IEG pension system for employees joining the sector from 1 September 2023. These employees will still benefit from the regulatory and negotiated measures, and other benefits associated with IEG status (such as the special 'tarif agent' energy price, family benefits, etc). The only difference is the pension system itself.

Finally, in view of the 2023 pension reform law of 14 April 2023, the national inter-industry agreement of 5 October 2023 took account of the consequences of the reform for the AGIRC-ARRCO complementary pension system by eliminating the temporary 10% bonus/discount which applied to AGIRC-ARRCO pensions when employees retired after/before qualifying for a full pension (solidarity or bonus coefficients). As these bonuses and discounts were funded by the special IEG pension system, their elimination has a favourable impact on the amount of the obligation covered by provisions recognised in the Group's 2023 financial statements due to the system affiliation mechanism.

In application of IAS 19, all the impacts of the pension reform described above are classified as plan amendments. The resulting past service cost amounts to €338 million, recognised in expenses in the income statement for 2023 (in other income and expenses, see note 7)

16.1.3 Actuarial assumptions and sensitivity analyses

The following actuarial assumptions are used:

(in %)	France		United Kingdom	
	31/12/2023	31/12/2022	31/12/2023	31/12/2022
Discount rate/rate of return on assets ⁽¹⁾	3.40%	3.90%	4.50%	4.75%
Inflation rate	2.00%	2.30%	2.90%	2.90%
Wage increase rate ⁽²⁾	3.10%	3.70%	2.75%	2.65%

⁽¹⁾ The interest income generated by assets is calculated using the discount rate. The difference between this interest income and the real return on assets is recorded in actuarial gains and losses in equity.

⁽²⁾ Average wage increase rate, including inflation and projected over a full career.

The discount rate used for employee benefit obligations is determined by applying the yield rate on high-quality corporate bonds of appropriate duration to maturities corresponding to the future disbursements resulting from these obligations. For longer durations, the calculation also takes into consideration data from a wider selection of corporate bonds adjusted for comparability with the high-quality bonds, as the panel of bonds with these durations is limited.

In France, changes in the economic and market parameters used have led the Group to set the nominal discount rate at 3.40% at 31 December 2023 (3.90% at 31 December 2022). The decrease in the discount rate essentially relates to the decrease in risk-free rates observed in 2023.

The inflation assumption is based on an inflation curve constructed from economic forecasts and inflation-indexed market products. As a result of changes in the economic and market parameters, the assumed average inflation rate used as the Group's benchmark for Euro zone countries is 2.00% at 31 December 2023 (2.30% at 31 December 2022).

Wage law projections from 2024 onwards are based on average wage increases observed in the IEG sector in recent years (adjusted for non-recurring effects).

The mortality table used to calculate obligations is based on the INSEE 2013-2070 generation table (produced by the French statistics office), corrected for differences in mortality between the general French population and the population covered by the IEG regime.

Sensitivity analyses on the amount of the obligations are as follows:

(in millions of euros)	31/12/2023	
	France	United Kingdom
Impact of a +/- 25bp variation in the discount rate	(1,091) / 1,172	(278) / 290
Impact of a +/- 25bp variation in the inflation rate	1,146 / (1,071)	270 / (259)
Impact of +/- 25bp variation in the wage increase rate	1,180 / (1,108)	n.a

n.a. : not applicable.

16.1.4 Breakdown by geographical area of post-employment and other long-term employee benefits

	2023			
(in millions of euros)	France	United Kingdom	Other	Total
Current service cost	(402)	(16)	(18)	(436)
Past service cost	(338)	92	(5)	(251)
Actuarial gains and losses – other long-term benefits	(102)	-	-	(102)
Net expenses recorded as operating expenses	(842)	76	(23)	(789)
Interest expense (discount effect)	(1,008)	(298)	(31)	(1,337)
Return on fund assets	357	336	15	708
Net interest expense included in financial result	(651)	38	(16)	(629)
EMPLOYEE BENEFIT EXPENSES RECORDED IN THE INCOME STATEMENT	(1,493)	114	(39)	(1,418)
Actuarial gains and losses – post-employment benefits	509	(470)	(30)	9
Actuarial gains and losses on fund assets	652	(259)	11	404
Actuarial gains and losses	1,161	(729)	(19)	413
Translation adjustments	-	19	(6)	13
GAINS AND LOSSES ON EMPLOYEE BENEFITS RECORDED DIRECTLY IN EQUITY	1,161	(710)	(25)	426

	2022			
(in millions of euros)	France	United Kingdom	Other	Total
Current service cost	(779)	(32)	(52)	(863)
Past service cost	-	-	(2)	(2)
Actuarial gains and losses – other long-term benefits	131	-	-	131
Net expenses recorded as operating expenses	(648)	(32)	(54)	(734)
Interest expense (discount effect)	(462)	(190)	(11)	(663)
Return on fund assets	171	242	6	419
Net interest expense included in financial result	(291)	52	(5)	(244)
EMPLOYEE BENEFIT EXPENSES RECORDED IN THE INCOME STATEMENT	(939)	20	(59)	(978)
Actuarial gains and losses – post-employment benefits	9,260	3,386	143	12,789
Actuarial gains and losses on fund assets	(3,737)	(5,505)	(53)	(9,295)
Actuarial gains and losses	5,523	(2,119)	90	3,494
Translation adjustments	-	(79)	13	(66)
GAINS AND LOSSES ON EMPLOYEE BENEFITS RECORDED DIRECTLY IN EQUITY	5,523	(2,198)	103	3,428

The actuarial gains and losses on obligations in France are as follow:

(in millions of euros)	2023	2022
Experience adjustments	1,308	(767)
Changes in demographic assumptions	-	145
Changes in financial assumptions ⁽¹⁾	(901)	10,013
ACTUARIAL GAINS AND LOSSES ON OBLIGATIONS	407	9,391
Including:		
Actuarial gains and losses on post-employment benefits	509	9,260
Actuarial gains and losses on other long-term benefits	(102)	131

⁽¹⁾ Financial assumptions mainly concern the discount rate, inflation rate and wage increase rate.

16.2 France (regulated activities, and generation and supply)

The two operating segments “France – Generation and Supply” and “France – Regulated activities” (see note 4.1) are combined here into a single subtotal, “France”, which primarily includes EDF and Enedis. Almost all of these companies’ employees have IEG status, including the special IEG pension and other IEG benefits.

16.2.1 Breakdown of obligations by type of beneficiary

(in millions of euros)	31/12/2023	31/12/2022
Current employees	12,673	12,831
Retirees	13,514	13,223
OBLIGATIONS	26,187	26,054

16.2.2 Provision for employee benefits by nature

At 31 December 2023

(in millions of euros)	Obligations	Fund assets	Provisions in the balance sheet
Provisions for post-employment benefits at 31/12/2023	24,727	(10,001)	14,726
Including:			
Pensions	19,667	(9,367) ⁽¹⁾	10,300
Benefits in kind (electricity/gas)	2,968	-	2,968
Retirement gratuities	781	(619)	162
Other	1,311	(15)	1,296
Provisions for other long-term employee benefits at 31/12/2023	1,460	-	1,460
Including:			
Annuities following work-related accident and illness, and invalidity	1,214	-	1,214
Long service awards	221	-	221
Other	25	-	25
PROVISIONS FOR EMPLOYEE BENEFITS AT 31/12/2023	26,187	(10,001)	16,186

⁽¹⁾ Mainly EDF SA's fund assets (52% of pension obligations were covered by funds at 31 December 2023).

At 31 December 2022

(in millions of euros)	Obligations	Fund assets	Provisions in the balance sheet
Provisions for post-employment benefits at 31/12/2022	24,650	(9,398)	15,252
Including:			
Pensions	19,564	(8,827) ⁽¹⁾	10,737
Benefits in kind (electricity/gas)	3,129	-	3,129
Retirement gratuities	754	(557)	197
Other	1,203	(14)	1,189
Provisions for other long-term employee benefits at 31/12/2022	1,404	-	1,404
Including:			
Annuities following work-related accident and illness, and invalidity	1,191	-	1,191
Long service award	188	-	188
Other	25	-	25
PROVISIONS FOR EMPLOYEE BENEFITS AT 31/12/2022	26,054	(9,398)	16,656

⁽¹⁾ Mainly EDF SA's fund assets (49% of pension obligations were covered by funds at 31 December 2022).

16.2.3 Fund assets

For France, fund assets, managed under an asset/liability model, amount to €10,001 million at 31 December 2023 (€9,398 million at 31 December 2022) and concern the coverage of retirement gratuities and the specific benefits of the special pension system. They consist of insurance contracts with the following risk profile:

- 67% in a hedging pocket consisting of bonds, designed to replicate variations in the obligation caused by changes in interest rates;
- 31% in a growth asset pocket consisting of international equities.
- 2% in real estate investments

Fund assets break down as follows:

(in millions of euros)	31/12/2023	31/12/2022
FUND ASSETS	10,001	9,398
Assets funding special pension benefits	9,367	8,827
Including (%)		
Listed debt instruments (bonds)	67%	65%
Listed equity instruments (shares)	31%	33%
Real estate property	2%	2%
Assets funding retirement gratuities	619	557
Including (%)		
Listed debt instruments (bonds)	59%	69%
Listed equity instruments (shares)	41%	31%
Other fund assets	15	14

At 31 December 2023, the bonds held as part of fund assets are distributed as follows:

- approximately 68% of the total are AAA and AA rated bonds;
- approximately 32% of the total are bonds with A, BBB and other ratings.

Around 60% of bonds are sovereign bonds issued by Euro zone countries, and the balance mainly consists of bonds issued by financial and non-financial firms.

At 31 December 2023, the equities held as part of fund assets are distributed as follows:

- approximately 64% of the total are shares in North American companies;
- approximately 19% of the total are shares in European companies;
- approximately 17% of the total are shares in companies in the Asia-Pacific zone and emerging countries.

This distribution is stable compared to the distribution at 31 December 2022.

The performance of pension fund assets in France is 11.1% in 2023.

16.2.4 Future Cash Flows

Cash flows related to future employee benefits are as follows:

(in millions of euros)	Cash flow under year-end economic conditions	Amount covered by provisions (present value)
Less than one year	1,078	1,061
One to five years	4,572	4,118
Five to ten years	5,647	4,330
More than ten years	48,132	16,678
CASH FLOWS RELATED TO EMPLOYEE BENEFITS	59,429	26,187

At 31 December 2023, the average duration of employee benefit commitments in France is 17 years.

16.3 United Kingdom

16.3.1 Breakdown of obligations by type of beneficiary

(in millions of euros)	31/12/2023	31/12/2022
Current employees	2,916	2,603
Retirees	3,997	3,798
OBLIGATIONS	6,913	6,401

16.3.2 Fund assets

The investment strategy applied in these funds is a liability driven investment strategy. The allocation between growth and back-to-back is regularly reviewed by the trustees, at least after every actuarial valuation, to ensure that the funds' overall investment strategy remains coherent in order to achieve the target coverage level required.

These assets break down as follows:

(in millions of euros)	31/12/2023	31/12/2022
FUND ASSETS	7,033	7,039
Including (%)		
Listed equity instruments (shares)	5%	0%
Listed debt instruments (bonds)	91%	62%
Real estate properties	9%	10%
Cash and cash equivalents	4%	3%
Other (including private equity) ⁽¹⁾	-9%	25%

⁽¹⁾ including the fair value of derivatives hedging listed instruments

At 31 December 2023, the bonds held as part of fund assets are distributed as follows:

- approximately 84% of the total are AAA and AA-rated bonds;
- approximately 16% of the total are bonds with A, BBB and other ratings.

Around 79% of all these bonds are sovereign bonds, mainly issued by the United Kingdom. The balance mainly consists of bonds issued by financial and non-financial firms.

16.3.3 Future cash flows

Cash flows related to future employee benefits are as follows:

(in millions of euros)	Cash flow under year-end economic conditions	Amount covered by provisions (present value)
Less than one year	261	255
One to five years	1,115	968
Five to ten years	1,572	1,107
More than ten years	11,654	4,583
CASH FLOWS RELATED TO EMPLOYEE BENEFITS	14,602	6,913

The average weighted duration of funds in the United Kingdom is 17 years at 31 December 2023.

Note 17 Other provisions and contingent liabilities

(in millions of euros)	Notes	31/12/2023			31/12/2022		
		Current	Non-current	Total	Current	Non-current	Total
Other provisions for decommissioning	17.1	116	1,943	2,059	127	2,006	2,133
Other provisions	17.2	3,175	2,935	6,110	3,885	2,665	6,550
OTHER PROVISIONS		3,291	4,878	8,169	4,012	4,671	8,683

17.1 Other provisions for decommissioning

The breakdown of other provisions for decommissioning by company is as follows:

(in millions of euros)	EDF	EDF Energy	Edison	Framatome	Other	Total
31/12/2023	1,017	48	127	430	437	2,059
31/12/2022	987	108	192	418	428	2,133

Other provisions for decommissioning principally concern fossil-fired power plants, installations for the production of nuclear fuel assemblies, and dismantling of wind farms.

The costs of decommissioning fossil-fired power plants are calculated using regularly updated studies based on estimated future costs, measured by reference to the charges recorded on past operations and the most recent estimates for plants still in operation. The provision recorded at 31 December 2023 reflects the most recent known cost estimates and includes rehabilitation costs for generation sites.

Provisions for decommissioning notably include €154 million for Basic nuclear facilities (INB) in France, in the amounts of €112 million for Framatome and €42 million for Cyclife France. Dedicated assets are set aside to cover these provisions as required by the regulations.

Dedicated assets of Framatome and Cyclife France

The dedicated assets of Framatome and Cyclife France relating to Basic nuclear facilities (INB) in France have realisable values of €104 million in Framatome and €60 million in Cyclife France and the degree of coverage of provisions according to the regulations is 93% for Framatome and 142% for Cyclife France. At Framatome, a plan is currently in preparation to reach at least 100% coverage within 5 years, in accordance with decree n°2020-830 of 1 July 2020.

17.2 Other provisions

Details of changes in other provisions are as follows:

(in millions of euros)	31/12/2022	Decreases			Changes in scope	Other changes ⁽¹⁾	31/12/2023
		Increases	Utilisations	Reversals			
Provisions for contingencies related to subsidiaries and investments	605	70	(45)	-	-	8	638
Provisions for tax liabilities (excluding income tax)	49	5	(21)	(7)	-	4	30
Provisions for litigation	321	122	(114)	(98)	-	2	233
Provisions for onerous contracts and losses on completion	638	167	(134)	-	11	(6)	676
Provisions related to environmental schemes	1,926	2,112	(2,350)	-	-	19	1,707
Other provisions for contingencies and losses	3,011	2,408	(2,641)	(89)	3	134	2,826
TOTAL	6,550	4,884	(5,305)	(194)	14	161	6,110

⁽¹⁾ Other changes principally concern rehabilitation of leased land

Provisions for onerous contracts

Provisions for onerous contracts mainly related to the Group's LNG activities (a long-term regasification contract with Dunkerque LNG). Losses on these contracts are measured by comparing the costs of fulfilling the contract with the resulting economic benefits, based on market and sales assumptions.

Framatome's long-term contracts are recorded under the percentage-of-completion method. When the estimated result upon completion is negative, the expected loss is immediately recorded in profit and loss, and a provision is booked to cover the portion of the loss not yet recognised.

Provisions related to environmental schemes

Provisions related to environmental schemes include provisions for greenhouse gas emission quota trading, renewable energy certificates and where relevant energy savings certificates (see notes 5.5.4, 10.2, 20.1 and 20.2.1).

At 31 December 2023, a provision of €1,176 million (€1,117 million at 31 December 2022) was booked in connection with the obligation to surrender **renewable energy certificates** at that date, essentially concerning EDF Energy (United Kingdom) and Luminus (Belgium). For reminder, a large portion of these obligations is covered by purchases of certificates included in intangible assets (see note 10.2).

One of the main features of the fourth period (2021-2030) of the European Union **greenhouse gas emission quota system** (SEQE-EU or EU-ETS) is to achieve the emission reduction targets set in the 2030 Climate and Energy framework, and the EU's contribution to the Paris Climate Agreement adopted in 2015.

In the EDF group, the entities concerned by this European system are EDF, Edison, Dalkia, PEI and Luminus.

The volume of emissions at 31 December 2023 stood at 14 million tonnes (18 million tonnes for 2022), reflected in the recognition of provisions of €531 million at 31 December 2023 (€799 million at 31 December 2022).

In 2023, the Group surrendered 18 million tonnes in respect of emissions generated in 2022 under the EU ETS (in 2022 it surrendered 17 million tonnes in respect of emissions generated in 2021).

The United Kingdom has set up its own system (UK ETS - Emissions Trading Scheme). The UK ETS, which uses a bidding system, covers the same sectors as the EU ETS and operates under generally similar rules, with comparable accounting treatment.

The volume of EDF Energy's emissions at 31 December 2023 stood at 4 thousand tonnes (0.1 million tonnes for 2022). Actual greenhouse gas emissions amounted to €0.4 million at 31 December 2023 (€9 million at 31 December 2022) and are included in provisions in the balance sheet.

In 2023, EDF Energy surrendered 0.1 million tonnes in respect of emissions generated in 2022 under the UK ETS (in 2022 it surrendered 2 million tonnes in respect of emissions generated in 2021).

Other provisions for contingencies and losses

A provision for contingencies and losses of €854 million was recognised at 31 December 2022 in connection with negotiations with Orano Recyclage concerning the amendment to the recycling agreement for the period 2024-2026. A further allocation of €1,026 million was made during the first half of 2023 in view of the ongoing negotiations, bringing the total provision to €1,880 million at 30 June 2023. Following the signature in September 2023 of an agreement on the principles for the future amendment for 2024-2026, to the master agreement with Orano Recyclage for 2008-2040 concerning removal, processing and recycling of spent fuel, this €1,880 million provision was cancelled and an amount of €2,216 million was allocated to the provision for spent fuel management based on the costs associated with the future 2024-2026 amendment, replacing the provision for contingencies and losses previously booked (see note 15.1.1.1).

These provisions also cover various contingencies and expenses related to operations (employers' matching contributions to employee profit sharing, restructuring operations, contractual maintenance obligations, etc.). No individual provision is significant.

In extremely rare cases, specific litigation covered by a provision may be unmentioned in the notes to the financial statements if such disclosure could cause serious prejudice to the Group.

17.3 Contingent liabilities and assets

ACCOUNTING PRINCIPLES AND METHODS

A contingent liability is:

- a potential obligation arising from past events, which will only be confirmed by the occurrence (or non-occurrence) of one or more uncertain future events that are not completely within the entity's control, or
- a present obligation arising from past events that is not recognised in the financial statements because an outflow of resources representing economic benefits is unlikely to be necessary to extinguish the obligation, or because the amount of the obligation cannot be measured reliably.

A contingent asset is a potential asset arising from past events, whose existence will only be confirmed by the occurrence (or non-occurrence) of one or more uncertain future events that are not completely within the entity's control.

The principal contingent liabilities and assets at 31 December 2023 are the following:

17.3.1 Tax inspections

EDF

For the period 2008 to 2019, the French tax authorities questioned the tax-deductibility of certain long-term nuclear liabilities.

Following several judgements and legal proceedings, the Council of State definitively confirmed in a ruling of 31 March 2023 that these nuclear liabilities are not tax-deductible. The accounting and financial consequences of a first, similar decision by the Council of State had been taken into account in the Company's financial statements since 2020.

For the years 2012 to 2019, the French tax authorities questioned the tax-deductibility of other long-term nuclear provisions. In a ruling of 29 August 2022, Montreuil Administrative Court validated the Company's position for one of the contested provisions, but upheld the tax adjustment for the other. In execution of this decision, the Company filed an appeal against the unfavourable part of the ruling and paid €297 million in 2022. The Minister has also appealed against the part of the ruling that was favourable to the Company.

EDF International

Following the tax inspections of EDF International for the years 2009 to 2014, the French tax authorities questioned the valuation of the bond convertible into shares issued to refinance the acquisition of British Energy. The total amount concerned was approximately €310 million. EDF International contested this reassessment.

In judgements of 2 July 2019 for the period 2009 - 2013 and 30 January 2020 for the year 2014, Montreuil Administrative Court confirmed the tax reassessments. EDF International therefore paid the tax in execution of these decisions, but also appealed against them. In a ruling of 25 January 2022, Versailles Administrative Court found in favour of EDF International and cancelled the first-instance judgments, thus nullifying the notified reassessments. In early 2022, EDF International received a full refund of the amounts it had paid. In a decision of 16 November 2022, the Council of State overturned the Administrative Court's ruling and sent the case back to be rejudged before the same court. In application of this decision, EDF International repaid the full amount previously received.

On 28 November 2023, the Administrative Court dismissed the new arguments put forward by EDF International, which lodged an appeal against this decision before the Council of State in late January 2024.

17.3.2 Labour litigation

EDF and its subsidiaries are party to a number of labour lawsuits. The Group considers that none of these lawsuits, individually, is likely to have a significant impact on its financial results or financial position. However, because they relate to situations that could concern a large number of EDF's employees in France, any increase in such litigations could have a potentially negative impact on the Group's financial position.

Additionally, EDF and its subsidiaries in France regularly undergo inspections by social security bodies such as URSSAF.

17.3.3 Litigation with photovoltaic producers

During 2010, announcements of a cut in purchase tariffs for photovoltaic electricity (the PV purchase tariff) were followed by adoption of the decree of 9 December 2010 (the "moratorium decree") suspending the conclusion of new contracts with purchase obligations for a three-month period for all applications that had not been approved by 2 December 2010. A new tariff decision was then adopted on 4 March 2011 that significantly reduced the PV purchase tariff, and this led to a large series of legal proceedings against Enedis and EDF in late 2011 which continued until 2015.

After a ruling by the Court of Justice of the European Union on 15 March 2017 that the decisions of 10 July 2006 and 12 January 2010 setting the PV purchase tariffs constituted illegal State aid, France's national courts, including the Court of Cassation (in a decision of 18 September 2019) all based their conclusions on this ruling, and considered that the prejudice caused to producers was not reparable because their claims were founded on illegal laws.

To date, the administrative courts, administrative appeal courts and Council of State (in several decisions issued on 27 October 2023) have dismissed the producers' claims.

Around twenty court cases are still pending.

In parallel to the compensation claims before civil courts, EDF and Enedis had sought to apply their Civil Liability insurance policy, but the insurers refused their claim. Enedis and EDF brought action against their insurers in April 2017, applying to the courts for formal recognition of two partial serial claims. A procedural hearing for this matter took place on 24 January 2024.

17.3.4 ARENH dispute – *Force majeure*

In the crisis caused by the Covid-19 pandemic, some suppliers requested total suspension of their ARENH deliveries, or partial suspension to the extent of the decrease in electricity consumption by their customer portfolio during the crisis, citing the force majeure clause contained in the master ARENH agreement signed with EDF.

Seven cases concerning the substance of the matter were brought by suppliers, claiming compensation from EDF for the prejudice caused by its allegedly unlawful refusal to apply the force majeure clause. The suppliers concerned are Hydroption, Vattenfall, Priméo Energie Grands Comptes and Priméo Energie Solutions, Arcelor Mittal Energy, Plüm Energy et Entreprises et Collectivités, TotalEnergies and Ekwater.

On 13 April 2021, the Paris Commercial Court issued a first judgement on the merits in the Hydroption case, ordering EDF to pay the claimant €5.88 million in damages. The court considered that the conditions for force majeure were fulfilled and concluded that in continuing its ARENH deliveries against Hydroption's wishes EDF had committed a breach of contract for which it could be held liable. On 15 October 2021, the Paris Court of Appeal overturned the Commercial Court's judgement insofar as it held EDF liable and ordered it to pay damages to Hydroption, considering that the exemption clause of force majeure was not established, and that EDF was not obliged to satisfy a request for suspension of the contract. On 2 December 2021, the Toulon Commercial Court placed Hydroption SAS in liquidation. The liquidator filed an appeal before the Court of Cassation on 19 January 2022. In a ruling of 22 March 2023, the Court of Cassation overturned and cancelled all the terms of the Paris Court of Appeal's verdict, solely on procedural grounds, and sent the case back before the Court of Appeal. EDF thus filed a new declaration of appeal at that court where a hearing before a different panel of judges is scheduled for 26 February 2024.

On 30 November 2021 the Paris Commercial Court issued two more judgements on the merits in the cases brought by TotalEnergies et Ekwater, ordering EDF to pay damages of €53.9 million to TotalEnergies and €1.8 million to Ekwater. EDF has appealed against these two judgments.

On 6 December 2022, the Paris Commercial Court issued two further judgements on the merits in the cases brought by Priméo Energie Grands Comptes and Priméo Energie Solutions, ordering EDF to pay these two companies damages of €1.7 million and €2.4 million respectively. EDF has appealed against these two judgments and the proceedings are ongoing.

On 27 March 2023, the Commercial Court confirmed Plüm's withdrawal from the litigation with EDF. On 24 May 2023, the same court dismissed Arcelor Mittal's claims. A certificate of non-appeal was received on 8 November 2023 and these two matters are now closed.

On 16 January 2024, the Paris Commercial Court issued a judgement on the merits of the Vattenfall case, ordering EDF to pay the company €5 million in damages. EDF may appeal this judgment within one month of its notification.

17.3.5 Edison

Environmental agreement with ENI

On 31 July 2023 Edison and ENI signed an agreement concerning the industrial sites contributed to Enimont in 1989. A provision of €430 million was therefore booked at 31 December 2023 (see note 17.2). The main purposes of this agreement are: i) to put an end to the litigation cases pending before the Milan Court of Appeal and prevent all further litigation on similar matters that could arise in future; ii) to define a mutual framework for conduct in environmental matters relating to these sites and resolve the environmental issues resulting from past pollution, on a 50/50 basis.

This agreement marks a major turning point in local regeneration and restoration activities for places like the sites it covers, which were significantly affected by the industrialisation processes of the last century.

One of the sites concerned by this Edison-ENI agreement is the industrial site at Mantua which is the subject of currently ongoing administrative and criminal court proceedings, described below.

Mantua - criminal proceedings

The Public Prosecutor's Office of Mantua decided to initiate criminal proceedings on the basis of Legislative Decree 231 of 2001, against certain executive directors working or having worked for Edison since 2015 and some of Edison's representatives for alleged environmental offences claimed to have occurred in certain areas of the Mantua petrochemical plant. These orders of the Province of Mantua were confirmed by the Council of State's ruling of April 2020 as described below. These proceedings are ongoing, with the first court hearing scheduled for 14 February 2024.

The Mantua petrochemical plant - which Edison (as the successor of Montedison) has not owned or managed since 1990 - is subject to a large-scale and complex programme of environmental clean-up and restoration activities which also concerned all of the areas targeted by the proceedings initiated by the Public Prosecutor. The ENI group has begun implementation of the programme. After the clean-up projects were transferred to Edison in June of last year following the above-mentioned ruling of the Council of State, Edison is carrying out many of the activities.

Mantua - environmental proceedings

Over the past few years, the Italian province of Mantua notified Edison of eight orders to rehabilitate the land and the whole Mantua petrochemical site sold by Montedison to the ENI group in 1990, despite two settlement agreements concerning these environmental issues signed by ENI and the Italian Ministry for the Environment.

Edison appealed against all these orders before the Brescia Division of the Lombardy regional administrative court, but lost its appeal in August 2018. Edison then took the matter to the Italian Council of State, which rejected Edison's appeal in a ruling of 1 April 2020 confirming the first-instance decisions. Edison pursued its appeal before the ECHR, and the proceedings are ongoing. However, as mentioned above, Edison has already begun cleanup work on the site, taking over from the previous operators and conducting a series of tenders.

Sale of Ausimont (site de Bussi)

Several legal actions before the civil, administrative and criminal courts were begun following the sale by Edison of the Ausimont SpA industrial complex to Solvay Solexis SpA in 2002. The following proceedings are still ongoing:

Administrative cases

On 28 February 2018, the Province of Pescara notified Solvay Speciality Polymers Italy SpA (formerly Solvay Solexis SpA) and Edison SpA of the launch of an administrative procedure to determine who was responsible for the pollution of the land outside the industrial complex belonging to Ausimont SpA which had been sold. The Province also ordered Edison to remove waste that was on the land concerned. Edison first appealed against this order before Pescara regional administrative court, and then before the Italian Council of State. In April 2020 the Council of State rejected the claim and Edison, considering the ruling unfair and unlawful, filed applications for its annulment before the Italian Court of Cassation, the Italian Council of State and the European Court of Human Rights (ECHR). The application before the Council of State has been rejected, while the case before the ECHR is still in process.

Edison has nonetheless begun work to make the site safe in agreement with the competent Public Administrations.

Arbitration

In 2012, arbitration proceedings were launched by Solvay SA and Solvay Specialty Polymers Italy SpA (the purchaser of Ausimont) for violation by Edison of the representations and warranties in environmental matters concerning the Bussi and Spinetta Marengo sites contained in the sale agreement.

At the end of June 2021, the Arbitral Tribunal issued a partial award, largely accepting the claims by Solvay Specialty Polymers Italy in relation to the environmental warranties given by Montedison under the Ausimont sale agreement signed in 2001. The Tribunal ordered Edison to pay compensation of €91 million for the period from May 2002 (closing date) to December 2016. This sentence was issued with one dissenting opinion by a member of the Arbitral Tribunal.

Edison's appeal against this award to the Swiss federal court of Lausanne was rejected in January 2022. The enforcement proceedings before the Milan Court of Appel ended on 24 January 2023 when Edison's action was dismissed, making the Arbitral Tribunal award enforceable. Edison has appealed before the Court of Cassation, and no hearing date has yet been set.

The Arbitral Tribunal postponed quantification of the damages suffered by Solvay Specialty Polymers Italy in the period after December 2016 and the legal fees incurred by the parties to a further phase of the arbitration, unless the parties reach an agreement in this respect. A hearing was held in September 2023, and the Tribunal's decision is expected to be given in late 2024 or early 2025.

Two civil cases:

- on 8 April 2019, the Italian Ministry for the Environment brought a civil action against Edison, claiming damages for environmental disaster. These proceedings are ongoing and are currently in the provisional investigation phase.
- in 2023, a similar civil action was brought by the town of Bussi sul Tirino, claiming damages for the prejudice allegedly suffered as a result of pollution in the zone. The debates are so far in the introductory phase.

Arbitration proceedings against Venture Global

In 2017, Edison signed a contract with the American company Venture Global LNG Inc to import liquefied natural gas from the United States. Deliveries were to start in 2023.

In breach of its contractual obligations, Venture Global has still not started to make the agreed volumes available to Edison, having chosen instead to sell this gas to other parties on the short-term wholesale market.

In response to this decision, in May 2023 Edison began arbitration proceedings against the American company, claiming compensation of some \$1,500 million. The hearing before the London International Arbitration Court is scheduled for October 2024.

17.3.6 Investigations by France's Competition Authority ("ADLC")

At 31 December 2022 France's Competition Authority (the ADLC) was investigating the EDF group in relation to three separate matters (the referral concerning heat networks, the Plüm complaint, the Xélan complaint).

Following the ex-officio referral to the ADLC on 4 November 2019 concerning the formation of a partnership for heat network operations by EDF, Dalkia, Électricité de Strasbourg, ES Services Énergétiques and EDEV, the ADLC issued its decision on 7 December 2023, dismissing the whole of the case.

There were no significant developments in the other ADLC investigations.

17.3.7 Inframarginal revenue cap in Belgium

In Belgium, the inframarginal revenue cap applicable from 1 August 2022 to 30 June 2023 is currently being challenged before the courts, notably regarding the legitimacy of possible retroactive application prior to 1 December 2022. This revenue cap was introduced as part of the European mechanism for capturing inframarginal rents on electricity production, adopted by the European Union on 6 October 2022 (see note 5.4) This challenge is currently under examination by the European authorities.

17.3.8 Litigation with E-Pango

On 14 December 2023 the alternative energy supplier E-Pango filed a claim against EDF, RTE and Enedis before the Paris Commercial Court for full compensation of the prejudice allegedly caused by the termination of its Balance Responsible Entity agreement with RTE. Following that termination E-Pango's authorisation to purchase electricity for resale was suspended, and as a result its customers were switched to a fallback contract with EDF as the temporary supplier.

E-Pango considers that its agreement with RTE was wrongfully terminated, and argues that it was a deliberate exclusion strategy by RTE, with the support of Enedis, for the benefit of EDF.

E-Pango is therefore claiming full compensation for its prejudice, valued at approximately €150 million based particularly on the end of its supply business, and the loss of the economic value of its competitive position.

The case has been deferred to 12 February 2024.

Note 18 Financial assets and liabilities

ACCOUNTING PRINCIPLES AND METHODS

Financial assets comprise equity instruments (particularly non-consolidated investments), debt securities, loans and receivables at amortised cost, derivative assets and cash and cash equivalents.

The classification and measurement of financial instruments depend on the business model and the instruments' contractual characteristics. They are carried at amortised cost, fair value through other comprehensive income (OCI), or fair value through profit and loss.

Financial liabilities comprise loans and other financial liabilities, bank credit and derivative liabilities.

Financial assets and liabilities are recorded in the balance sheet as current if they mature within one year and non-current if they mature after one year, apart from derivatives held for trading, which are all classified as current.

DERECOGNITION OF FINANCIAL ASSETS AND LIABILITIES

The Group derecognises a financial asset when:

- the contractual rights to the cash flows generated by the asset expire, or
- the Group transfers the rights to receive contractual cash flows related to the financial asset through the transfer of substantially all of the risks and rewards associated with ownership of the asset.

Any interest created or retained by the Group in transferred financial assets is recorded as a separate asset or liability.

The Group derecognises a financial liability when its contractual obligations are extinguished, cancelled or expire. When a debt is renegotiated with a lender the Group derecognises the debt and recognises a new liability when the new terms are substantially different; otherwise, the book value is recalculated. In either case, the impacts of the debt renegotiation are recorded in profit and loss.

18.1 Financial assets

ACCOUNTING PRINCIPLES AND METHODS

The accounting treatment of financial assets depends on their contractual characteristics and business model

FINANCIAL ASSETS CARRIED AT FAIR VALUE THROUGH OCI WITH OR WITHOUT RECYCLING

Financial assets carried at fair value through OCI comprise:

- non-consolidated investments for which the Group has irrevocably opted to recognise subsequent fair value changes in OCI, with no recycling to profit and loss in the event of sale. Only dividends received from these investments are recognised in the income statement, under "Other financial income";
- debt securities (such as bonds) invested under a mixed "collect and sell" business model for which contractual cash flows consist entirely of principal and interest payments reflecting the time value of money and the credit risk associated with the instrument (the IFRS 9 "SPPI" test – Solely Payment of Principal and Interest). Changes in fair value are recorded directly in OCI with recycling and transferred to profit and loss when the securities are sold. For these debt securities, interest income is calculated at the effective interest rate and credited to the income statement under the heading "Other financial income".

Upon **initial recognition**, these financial assets are recorded at fair value plus transaction costs attributable to their acquisition.

At each reporting date, they are adjusted to fair value based on quoted prices where possible, or using the discounted future cash flow method or by reference to external sources otherwise. Changes in the fair value of these instruments are recorded directly in OCI with recycling (for debt securities) or OCI with no recycling (for equity instruments) in the income statement.

FINANCIAL ASSETS CARRIED AT FAIR VALUE THROUGH PROFIT AND LOSS

Financial assets carried at fair value through profit and loss comprise:

- assets acquired from inception with the intention of resale in the short term;
- derivatives not classified as hedges (derivatives held for trading);
- equity instruments (non-consolidated investments) which the Group has not irrevocably opted to classify as at fair value through OCI with no recycling;
- debt securities that do not meet the requirements of the SPPI test, regardless of their business model. This chiefly concerns shares in investment funds.

These assets are recorded **at the transaction date** at fair value, which is generally equal to the amount of cash paid out. Transaction costs directly attributable to the acquisition are recorded in the income statement.

At each reporting date, they are adjusted to fair value based on quoted prices where possible, or using recognised valuation techniques such as the discounted cash flow method or reference to external sources otherwise. Changes in the fair value of these instruments are recorded in the income statement under the heading "Other financial income and expenses".

FINANCIAL ASSETS CARRIED AT AMORTISED COST

Loans and financial receivables are carried at amortised cost if the business model involves holding the instrument in order to collect contractual cash flows which consist entirely of principal and interest.

The interest received is calculated under the effective interest rate method and recorded in "Other financial income" in the income statement.

Loans and financial receivables that are not eligible for classification at amortised cost are carried at fair value through profit and loss, and recorded in "Other financial income and expenses" in the income statement.

IMPAIRMENT MODEL

The impairment model is based on expected credit loss (ECL). The Group applies a rating-based approach for counterparties with low credit risk. In application of the risk management policy, the Group's bond portfolio consists almost entirely of instruments issued by low-risk counterparties rated "Investment Grade".

In this situation, the ECL is estimated over a 12-month horizon following the year-end.

The threshold indicating a significant increase in credit risk is reached when the counterparty ceases to be rated "Investment Grade". The significant increase in the default risk may lead to reassessment of the ECL over the instrument's residual life.

For loans and receivables, the Group has chosen an approach based on the probability of default by the counterparty and assessment of changes in the credit risk.

18.1.1 Breakdown between current and non-current financial assets

Current and non-current financial assets break down as follows:

(in millions of euros)	31/12/2023			31/12/2022		
	Current	Non-current	Total	Current	Non-current	Total
Instruments at fair value through OCI with recycling	18,014	5,894	23,908	17,014	4,982	21,996
Instruments at fair value through OCI with no recycling	30	268	298	36	207	243
Instruments at fair value through profit and loss	1,845	25,629	27,474	1,409	23,490	24,899
Debt and equity securities	19,889	31,791	51,680	18,459	28,679	47,138
Trading derivatives – Positive fair value	14,519	-	14,519	30,566	-	30,566
Hedging derivatives – Positive fair value	2,654	3,512	6,166	6,903	5,376	12,279
Loans and financial receivables ⁽¹⁾	2,380	13,024	15,404	2,105	14,457	16,562
CURRENT AND NON-CURRENT FINANCIAL ASSETS	39,442	48,327	87,769	58,033	48,512	106,545

⁽¹⁾Including impairment of €(353) million at 31 December 2023 (€(386) million at 31 December 2022).

The decrease in the positive fair value of trading derivatives (€(16) billion) is explained by a decrease in the value of derivatives used in the trading activity, principally associated with commodity market price movements observed in 2023, and to a lesser extent the lower volumes contracted.

18.1.2 Debt and equity securities

Details of debt and equity securities

Financial assets are monitored and managed by the Group with two main objectives:

- **dedicated assets set aside in France for secure financing of nuclear plant decommissioning expenses and long-term storage expenses for radioactive waste, as required by article L. 594 of France's Environment Code.** These assets consist of diversified investments in bonds, monetary and equity investment funds, and equity investments held by EDF Invest. The general management policy for dedicated assets and a breakdown of the portfolio is presented in note 15.1.2;
- **assets managed according to a liquidity-oriented policy** ("liquid assets"). These are financial assets consisting of funds or interest rate instruments with initial maturity of over three months that are readily convertible into cash. EDF's monetary investment funds included in liquid assets amount to €1,369 million at 31 December 2023 (€1,115 million at 31 December 2022).

Details of debt and equity securities are shown in the table below:

(in millions of euros)	31/12/2023			31/12/2022	
	At fair value through OCI with recycling	At fair value through OCI with no recycling	At fair value through profit and loss	Total	Total
Debt and equity securities					
EDF dedicated assets	5,522	-	24,888	30,410	27,369
Liquid assets	18,304	-	1,773	20,077	18,507
Other assets ⁽¹⁾	82	298	813	1,193	1,262
TOTAL	23,908	298	27,474	51,680	47,138

⁽¹⁾Investments in non-consolidated companies.

Changes in debt and equity securities

(in millions of euros)	31/12/2022	Net increases	Changes in fair value	Changes in scope	Translation adjustments	Other	31/12/2023
Instruments at fair value through OCI with recycling	21,996	1,349	889	(72)	(153)	(101)	23,908
Instruments at fair value through OCI with no recycling	243	18	44	(19)	-	12	298
Instruments at fair value through profit and loss	24,899	364	2,164	61	(8)	(6)	27,474
TOTAL DEBT AND EQUITY SECURITIES	47,138	1,731	3,097	(30)	(161)	(95)	51,680

Changes in fair value recorded in equity

Changes in the fair value of debt and equity securities were recorded in equity (EDF share) over the period as follows:

(in millions of euros)	2023			2022		
	Gross changes in fair value recorded in OCI with recycling ⁽¹⁾	Gross changes in fair value recorded in OCI with no recycling ⁽¹⁾	Gross changes in fair value recycled to profit and loss ⁽²⁾	Gross changes in fair value recorded in OCI with recycling ⁽¹⁾	Gross changes in fair value recorded in OCI with no recycling ⁽¹⁾	Gross changes in fair value recycled to profit and loss ⁽²⁾
EDF dedicated assets	319	-	(112)	(1,081)	-	(206)
Liquid assets	525	-	(14)	(850)	-	(65)
Other assets	-	46	-	-	(16)	-
DEBT AND EQUITY SECURITIES⁽³⁾	844	46	(126)	(1,931)	(16)	(271)

⁽¹⁾+ / (-): increase / (decrease) in equity (EDF share).

⁽²⁾+ / (-): increase / (decrease) in income (EDF share).

⁽³⁾Excluding associates and joint ventures.

In 2023, gross changes in fair value recorded in OCI with recycling principally concern EDF (€970 million, including €431 million for dedicated assets). In 2022, gross changes in fair value recorded in OCI with recycling principally concern EDF (€(1,660) million, including €(875) million for dedicated assets).

No significant impairment was recorded in 2023.

18.1.3 Loans and financial receivables

Loans and financial receivables consist of the following:

(in millions of euros)	31/12/2023	31/12/2022
Amounts receivable from the NLF	13,104	14,000
Loans and financial receivables – other	2,300	2,562
LOANS AND FINANCIAL RECEIVABLES	15,404	16,562

At 31 December 2023 loans and financial receivables mainly include:

- amounts representing reimbursements receivable from the Nuclear Liabilities Fund (NLF) and the British government for coverage of long-term nuclear obligations, totalling €13,104 million at 31 December 2023 (€14,000 million at 31 December 2022), discounted at the same rate as the provisions they finance (see note 15.2);
- other loans and financial receivables notably include:
 - the overfunding of EDF Energy's EDFG (EDF Group of the ESPS) pension scheme by €134 million at 31 December 2023, compared to €658 million at 31 December 2022 (see note 16.1.1),
 - an amount of €298 million representing the advance payments made by Luminus to Synatom to cover long-term nuclear obligations (€253 million at 31 December 2022 and see note 15.3). In Luminus' financial statements these amounts are discounted at the same rate as the provisions they fund. This receivable is equal to the fair value of the amounts held by Synatom on behalf of Luminus as fund assets,
 - loans made by EDF Renewables in the course of its project development activity to associates and joint ventures mainly in connection with wind farms in France, the United Kingdom and North America, amounting to €903 million at 31 December 2023 compared to €823 million at 31 December 2022.

Changes in loans and financial receivables

(in millions of euros)	31/12/2022	Net increases	Discount effect	Changes in scope	Translation adjustments	Other	31/12/2023
Loans and financial receivables	16,562	(461)	933	(45)	296	(1,881)	15,404

Other changes in loans and financial receivables principally correspond to the changes in the receivable representing amounts reimbursable by the Nuclear Liabilities Fund (NLF) and the British government, and the surplus funding of EDF Energy's EDFG pension scheme.

18.2 Cash and cash equivalents

ACCOUNTING PRINCIPLES AND METHODS

Cash and cash equivalents comprise immediately available liquidities and very short-term investments that are readily convertible (e.g. in monetary funds) into a known amount of cash, usually maturing within three months or less of the acquisition date, and with negligible risk of fluctuation in value. These items are held to cover short-term obligations rather than for short-term investments or other purposes. When they mature in more than 3 months, they are included in Liquid assets in Debt and equity securities (see note 18.1.2).

“Cash equivalents” are recorded at fair value, with changes in fair value included in the heading “Other financial income and expenses”.

Cash and cash equivalents include the following amounts recorded in the balance sheet:

(in millions of euros)	31/12/2023	31/12/2022
Cash	8,861	10,261
Cash equivalents	1,914	687
CASH AND CASH EQUIVALENTS	10,775	10,948

Cash restrictions

Cash and cash equivalents include €369 million of cash subject to restrictions at 31 December 2023 (€566 million at 31 December 2022) (see note 1.3.5).

18.3 Financial liabilities

ACCOUNTING PRINCIPLES AND METHODS

Loans and other financial liabilities are carried at amortised cost, adjusted for changes in the value of the risks hedged when they are covered by a fair value hedge (see note 18.7). Interest expenses are calculated at the effective interest rate and recorded in the income statement in “Cost of gross financial indebtedness” over the duration of the loan or financial liability.

18.3.1 Breakdown between current and non-current financial liabilities

Current and non-current financial liabilities break down as follows:

(in millions of euros)	31/12/2023			31/12/2022		
	Non-current	Current	Total	Non-current	Current	Total
Loans and other financial liabilities	67,769	18,878	86,647	67,340	28,713	96,053
Trading derivatives - negative fair value ⁽¹⁾	-	14,418	14,418	-	28,884	28,884
Hedging derivatives - negative fair value ⁽¹⁾	1,955	4,807	6,762	3,718	14,247	17,965
FINANCIAL LIABILITIES	69,724	38,103	107,827	71,058	71,844	142,902

⁽¹⁾See note 18.7.

The decrease in the negative fair value of trading derivatives (€(14.5) billion) is explained by the decrease in prices observed on the commodity markets in 2022, and to a lesser extent the lower volumes contracted.

18.3.2 Loans and other financial liabilities

18.3.2.1 Changes in loans and other financial liabilities

(in millions of euros)	Bonds	Loans from financial institutions	Other financial liabilities	Lease liability	Accrued Interest	Total
Balances at 31/12/2022	45,150	20,278	25,115	4,269	1,241	96,053
Increases	8,029	1,498	2,419	704	395	13,045
Decreases	(2,003)	(3,567)	(15,489)	(752)	(110)	(21,921)
Translation adjustments	66	(56)	19	(8)	(61)	(40)
Changes in scope of consolidation	-	204	(11)	(1)	2	194
Changes in fair value	231	(24)	(37)	-	-	170
Other changes ⁽¹⁾	(2,390)	(20)	1,431	106	19	(854)
BALANCES AT 31/12/2023	49,083	18,313	13,447	4,318	1,486	86,647

⁽¹⁾ Other changes include €1,369 million corresponding to reclassification of perpetual subordinated bonds as Other financial liabilities including €546 million in view of the commitment to redeem those bonds at 22 January 2024 (see note 14.3).

In 2023, EDF issued approximately €8 billion of **senior bonds** on various markets, notably:

- On 19 January 2023, a 4-tranche senior multi-currency bond issue with nominal value of €2 billion and £950 million;
- On 17 May 2023, a 5-tranche senior bond issue of \$3 billion and CAD500 million;
- On 28 November 2023, a green bond issue with nominal value of €1.0 billion (see note 18.3.2.2);

In March 2023, EDF redeemed senior bonds to the value of €2.0 billion.

The principal operations in 2023 concerning **loans from financial institutions** relate to drawings on credit lines totalling €1 billion (€0.9 billion on 4 bilateral credit lines concluded in 2023, and €0.1 million on a credit line concluded in 2022), and the repayment of several bilateral credit lines amounting €3.1 billion.

At 31 December 2023, **other financial liabilities** include negotiable debt instruments amounting to €4,986 million, and an amount of €3,544 million recognised in respect of the cash received for debt securities transferred to several banks under repurchase agreements. These operations are undertaken for liquidity management purposes and do not affect the net indebtedness.

A breakdown of the issuance and repayments of borrowings as presented in the cash flow statement is presented below:

(in millions of euros)	Bonds	Loans from financial institutions	Other financial liabilities	Lease liability	Termination of hedging derivatives	31/12/2023
Issuance of borrowings	8,029	1,498	2,419	-	1	11,947
Repayments of borrowings	(2,003)	(3,567)	(15,489)	(752)	99	(21,712)

18.3.2.2 Principal borrowings of the Group

The Group's principal borrowings (excluding Green Bonds) at 31 December 2023 are as follows:

Type of borrowing (in millions of currencies)	Entity	Issue date ⁽¹⁾	Maturity	Issue amount	Currency	Rate
Euro MTN	EDF	09/2009	09/2024	2,500	EUR	4.63%
Euro MTN	EDF	11/2010	11/2025	750	EUR	4.00%
Bond	EDF	10/2022	12/2026	750	EUR	3.88%
Bond	EDF	01/2017	01/2027	107,900	JPY	1.09%
Euro MTN	EDF	03/2012	03/2027	1,000	EUR	4.13%
Bond	EDF	05/2023	05/2028	1,000	USD	5.70%
Bond	EDF	09/2018	09/2028	1,800	USD	4.50%
Bond	EDF	10/2022	10/2029	1,000	EUR	4.38%
Euro MTN	EDF	04/2010	04/2030	1,500	EUR	4.63%
Euro MTN	EDF	10/2018	10/2030	1,000	EUR	2.00%
Euro MTN	EDF	07/2001	07/2031	650	GBP	5.88%
Euro MTN	EDF	01/2023	01/2032	1,000	EUR	4.25%
Euro MTN	EDF	02/2003	02/2033	850	EUR	5.63%
Bond	EDF	05/2023	05/2033	1,000	USD	6.25%
Euro MTN	EDF	06/2009	06/2034	1,500	GBP	6.13%
Euro MTN	EDF	10/2016	10/2036	750	EUR	1.88%
Bond	EDF	09/2018	09/2038	650	USD	4.88%
Bond	EDF	01/2009	01/2039	1,750	USD	6.95%
Bond	EDF	01/2010	01/2040	850	USD	5.6%
Euro MTN	EDF	11/2010	11/2040	750	EUR	4.5%
Euro MTN	EDF	10/2011	10/2041	1,250	GBP	5.50%
Euro MTN	EDF	01/2023	01/2043	1,000	EUR	4.63%
Bond	EDF	01/2014	01/2044	1,000	USD	4.88%
Bond	EDF	10/2015	10/2045	1,500	USD	4.75%
Bond	EDF	10/2015	10/2045	1,150	USD	4.95%
Bond	EDF	09/2018	09/2048	1,300	USD	5.00%
Euro MTN	EDF	12/2019	12/2049	1,250	EUR	2.00%
Euro MTN	EDF	09/2010	09/2050	1,000	GBP	5.13%
Bond	EDF	05/2023	05/2053	1,000	USD	6.90%
Euro MTN	EDF	10/2016	10/2056	2,164	USD	4.99%
Euro MTN	EDF	11/2019	12/2069	2,000	USD	4.50%
Bond	EDF	01/2014	01/2114	700	USD	6.00%
Bond	EDF	01/2014	01/2114	1,350	GBP	6.00%

⁽¹⁾ Date funds were received.

At 31 December 2023, the Group's principal **Green Bonds** (see note 20.3.1) are as follows:

Type of borrowing (in millions of currency units)	Issue date ⁽¹⁾	Maturity	Issue amount	Currency	Rate
Bond	10/2015	10/2025	1,250	USD	3.63 %
Euro MTN	10/2016	10/2026	1,750	EUR	1.00 %
Euro MTN	12/2023	06/2027	1,000	EUR	3.75%
Euro MTN	08/2023	09/2027	200	CHF	2.30%
Bond	01/2017	01/2029	19,600	JPY	1.28%
Euro MTN	08/2023	09/2031	125	CHF	2.55%
Bond	01/2017	01/2032	6,400	JPY	1.57%
Euro MTN	11/2021	11/2033	1,850	EUR	1.00 %
Bond	10/2022	10/2034	1,250	EUR	4.75 %

⁽¹⁾ Date funds were received.

On 8 September 2020, EDF made an offering of Green Bonds convertible into new shares and/or exchangeable for existing shares (**OCEANEs Vertes**) with the nominal amount of €2,400 million at a 0% rate.

Holders of these bonds have the right to convert them into new EDF shares and/or exchange them for existing EDF shares.

On 23 November 2023, following the French government's simplified tender offer, the conversion/exchange ratio was raised to 1.289 EDF share per OCEANE bond.

On 8 February 2023, the AMF published the result of the French government's simplified tender offer for the equity securities of EDF, after the offer closed on 3 February 2023 (see notes 2 and 14.1).

Following the squeeze-out on 8 June 2023, the remaining 80,298 OCEANE bonds that had not been tendered to the offer were transferred to the State, giving rise to conversion of all those bonds on 13 June 2013, and delisting of EDF's OCEANE bonds from Euronext Access (see note 14.4).

18.3.3 Loans and financial liabilities by maturity, currency and interest rate

18.3.3.1 Maturity of loans and financial liabilities

(in millions of euros)	Bonds	Loans from financial institutions	Other financial liabilities	Lease liability	Accrued Interest	Total
Less than one year	2,911	1,498	12,687	703	1,079	18,878
From one to five years	10,888	14,860	480	2,006	119	28,353
More than five years	35,284	1,955	280	1,609	288	39,416
LOANS AND OTHER FINANCIAL LIABILITIES AT 31/12/2023	49,083	18,313	13,447	4,318	1,486	86,647

The non-discounted lease liability matures as follows:

(in millions of euros)	31/12/2023				31/12/2022
	Maturity				Total
	Total	< 1 year	1-5 years	> 5 years	
NON-DISCOUNTED CONTRACTUAL CASH FLOWS	5,089	825	2,329	1,935	4,844

18.3.3.2 Breakdown of loans and other financial liabilities by currency

The breakdown of loans and other financial liabilities by currency includes the effect of derivatives classified as hedges (of debts in foreign currencies and net investments in foreign subsidiaries) under IFRS 9.

At 31 December 2023

(in millions of euros)	31/12/2023				
	Initial debt structure		Impact of hedging instruments	Debt structure after hedging	
	amount	% of debt	amount	amount	% of debt
Euro (EUR)	51,346	59%	12,811	64,157	74%
American dollar (USD)	20,860	24%	(16,634)	4,226	5%
Pound sterling (GBP)	9,849	12%	5,989	15,838	18%
Other	4,592	5%	(2,166)	2,426	3%
LOANS AND OTHER FINANCIAL LIABILITIES	86,647	100%	-	86,647	100%

At 31 December 2022

(in millions of euros)	31/12/2022				
	Initial debt structure		Impact of hedging instruments	Debt structure after hedging	
	amount	% of debt	amount	amount	% of debt
Euro (EUR)	62,269	65%	13,789	76,058	79%
American dollar (USD)	21,465	22%	(15,813)	5,652	6%
Pound sterling (GBP)	8,149	9%	3,284	11,433	12%
Other	4,170	4%	(1,260)	2,910	3%
LOANS AND OTHER FINANCIAL LIABILITIES	96,053	100%	-	96,053	100%

18.3.3.3 Breakdown of loans and other financial liabilities by type of interest rate

The breakdown of loans and other financial liabilities by type of interest rate includes the effect of derivatives classified as hedges under IFRS 9.

At 31 December 2023

(in millions of euros)	31/12/2023				
	Initial debt structure		Impact of hedging instruments	Debt structure after hedging	
	amount	% of debt	amount	amount	% of debt
Fixed rates	67,531	78%	(16,197)	51,334	59%
Floating rates	19,116	22%	16,197	35,313	41%
LOANS AND OTHER FINANCIAL LIABILITIES	86,647	100%	-	86,647	100%

At 31 December 2022

(in millions of euros)	31/12/2022				
	Initial debt structure		Impact of hedging instruments	Debt structure after hedging	
	amount	% of debt	amount	amount	% of debt
Fixed rates	69,748	73%	(13,784)	55,964	58%
Floating rates	26,305	27%	13,784	40,089	42%
LOANS AND OTHER FINANCIAL LIABILITIES	96,053	100%	-	96,053	100%

A large portion of the Group's fixed-rate loans is swapped to variable rates.

18.3.4 Early repayment clauses

Project financing loans from non-Group parties to SPV-type project companies owned by EDF Renewables may include early repayment clauses that principally apply when the project company concerned fails to respect certain covenants, particularly a minimum Debt Service Coverage Ratio (DSCR). In general, early repayment clauses are activated when this ratio falls below 1.

In other Group entities, certain clauses contained in contracts for financing or other commitments may make reference to Group credit ratings but are not classified as covenants.

Eleven loans with a combined total of €2,330 million contain a rendez-vous clause requiring contact between the borrower and lender if the borrower's credit rating falls below a specified level, possibly leading to renegotiation of the terms of the loan.

No early repayment took place in 2023 as a result of any Group entity's failure to comply with contractual clauses concerning loans.

18.4 Unused credit lines

In 2023, EDF concluded two credit lines with a combined total of €900 million. One other credit line amounting to €300 million matured.

Edison also contractualised a €1 billion credit line from a pool of banks, which is guaranteed to the extent of 70% by Italy's national export credit agency SACE.

At 31 December 2023, the Group has unused credit lines with various banks totalling €15,842 million (€14,051 million at 31 December 2022), including €11,175 million of credit lines indexed on ESG criteria.

(in millions of euros)	31/12/2023				31/12/2022
	Maturity				Total
	Total	< 1 year	1-5 years	> 5 years	
CONFIRMED CREDIT LINES	15,842	4,842	10,971	29	14,051

18.5 Fair value of financial instruments

ACCOUNTING PRINCIPLES AND METHODS

Financial instruments are stated at fair value, which corresponds to the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction on the principal or most advantageous market at the measurement date. The valuation methods for each level are generally as follows:

- level 1 (unadjusted quoted prices): prices accessible to the entity at the measurement date on active markets, for identical assets or liabilities;
- level 2 (observable data): data concerning the asset or liability, other than the market prices included in initial level 1 input, which are directly observable (such as a price) or indirectly observable (i.e. deduced from observable prices);
- level 3 (non-observable data): data that are not observable on a market, including observable data that have been significantly adjusted.

The distribution of financial assets and liabilities in the balance sheet by level is as follows:

At 31 December 2023

(in millions of euros)	Balance sheet value	Fair value	Level 1 Unadjusted quoted prices	Level 2 Observable data	Level 3 Non-observable data
Equity securities	2,527	2,527	-	2,020	507
Debt securities	49,153	49,153	6,599	42,400	154
Hedging derivatives	6,166	6,166	14	6,152	-
Trading derivatives	14,519	14,519	477	11,851	2,191
Cash equivalents	1,914	1,914	61	1,853	-
FINANCIAL ASSETS CARRIED AT FAIR VALUE	74,279	74,279	7,151	64,276	2,852
Receivables from the NLF	13,104	13,104	-	13,104	-
Other loans and financial receivables	2,300	2,300	-	2,300	-
FINANCIAL ASSETS CARRIED AT AMORTISED COST	15,404	15,404	-	15,404	-
Hedging derivatives	6,762	6,762	37	6,725	-
Trading derivatives	14,418	14,418	487	12,921	1,010
FINANCIAL LIABILITIES CARRIED AT FAIR VALUE	21,180	21,180	524	19,646	1,010
Loans and other financial liabilities	86,647	84,736	-	84,736	-
FINANCIAL LIABILITIES CARRIED AT AMORTISED COST	86,647	84,736	-	84,736	-

Level 3 debt and equity securities are principally non-consolidated investments carried at historical value.

At 31 December 2022

	Balance sheet value	Fair value	Level 1 Unadjusted quoted prices	Level 2 Observable data	Level 3 Non-observable data
(in millions of euros)					
Equity securities	2,597	2,597	-	2,093	504
Debt securities	44,541	44,541	2,849	41,542	150
Hedging derivatives	12,279	12,279	188	12,091	-
Trading derivatives	30,566	30,566	882	28,378	1,306
Cash equivalents	687	687	64	623	-
FINANCIAL ASSETS CARRIED AT FAIR VALUE	90,670	90,670	3,983	84,727	1,960
Receivables from the NLF	14,000	14,000	-	14,000	-
Other loans and financial receivables	2,562	2,562	-	2,562	-
FINANCIAL ASSETS CARRIED AT AMORTISED COST	16,562	16,562	-	16,562	-
Hedging derivatives	17,965	17,965	9	17,913	43
Trading derivatives	28,884	28,884	773	27,447	664
FINANCIAL LIABILITIES CARRIED AT FAIR VALUE	46,849	46,849	782	45,360	707
Loans and other financial liabilities	96,053	93,264	-	93,264	-
FINANCIAL LIABILITIES CARRIED AT AMORTISED COST	96,053	93,264	-	93,264	-

Level 3 debt and equity securities are principally non-consolidated investments carried at historical value.

18.6 Market and counterparty risks

As an operator in the energy sector worldwide, the EDF group is exposed to financial market risks, energy market risks and counterparty risks. All these risks could generate volatility in the financial statements.

A more detailed description of these risks and the sensitivity analyses required by IFRS 7 can be found in chapter 6 of the 2023 Management Report.

Financial market risks

The main financial market risks to which the Group is exposed are the liquidity risk, the foreign exchange risk, the interest rate risk and the equity risk.

The objective of the Group's liquidity risk management is to seek resources at optimum cost and ensure their constant accessibility.

The foreign exchange risk relates to the diversification of the Group's businesses and geographical locations, and results from exposure to the risk of exchange rate fluctuations. These fluctuations can affect the Group's translation differences, balance sheet items, financial expenses, equity and net income.

The interest rate risk results from exposure to the risk of fluctuations in interest rates that can affect the value of assets invested by the Group, the value of the liabilities covered by provision, or its financial expenses.

The Group is exposed to equity risks, particularly through its dedicated asset portfolio held for secure financing of long-term nuclear commitments, through external pension funds, and to a lesser extent through its cash assets and directly-held investments.

Energy market risks

The EDF group operates on deregulated energy markets, mainly in Europe, through its generation, supply and trading activities. This exposes the Group to price variations on the wholesale markets for energy (electricity, gas, coal, oil products) and the CO₂ emissions quota market, with a potentially significant impact on the financial statements.

Counterparty risks

Counterparty risk is defined as the total loss that the EDF group would sustain on its business and market transactions if a counterparty defaulted and failed to perform its contractual obligations.

Regarding the customer risk, which is another component of the counterparty risk, a statement of receivables not yet due and overdue is shown in note 13.3.1.

18.7 Derivatives and hedge accounting

ACCOUNTING PRINCIPLES AND METHODS

The Group uses derivatives such as swaps and forward contracts to hedge its interest rate, foreign exchange, energy and commodity risks.

In accordance with IFRS 9, hedge accounting can be applied to derivatives when they meet certain eligibility criteria. Some derivatives classified as "own use" are excluded from application of IFRS 9.

DERIVATIVES NOT COVERED BY IFRS 9: "OWN USE" CONTRACTS

Forward purchase and sale contracts for physical delivery of energy or commodities are considered to fall outside the scope of application of IFRS 9 when they are entered into as part of the Group's normal business activity ("own use"). This is demonstrated to be the case when all the following conditions are fulfilled:

- a physical delivery takes place under all such contracts;
- the volumes purchased or sold under these contracts correspond to the Group's operating requirements;
- the contracts cannot be considered as options as defined by the standard. In the specific case of electricity sale contracts, the contract is equivalent to a firm forward sale or can be considered as a capacity sale.

The Group considers that transactions negotiated with a view to balancing the volumes between electricity purchase and sale commitments are part of its normal business as an integrated electricity operator, and are thus outside the scope of IFRS 9.

MEASUREMENT AND RECOGNITION OF DERIVATIVES

Derivatives are initially recorded at fair value, based on quoted prices and market data available from external sources. If no quoted prices are available, the Group may refer to recent comparable transactions or, if no such transactions exist, base its valuation on internal models that are recognised by market participants, giving priority to information directly derived from observable data such as over-the-counter listings.

In application of IFRS 13, the fair value of derivatives incorporates the counterparty credit risk for derivative assets and the own credit risk for derivative liabilities.

DERIVATIVES CLASSIFIED AS HEDGES

The EDF group uses derivatives to hedge its foreign exchange and interest rate risks, as well as risks related to certain commodity contracts.

The Group applies the criteria defined by IFRS 9 to identify operations subject to hedge accounting, particularly regarding the existence of formal documentation from their inception and compliance with hedge effectiveness requirements.

The hedging relationship ends when it ceases to satisfy the above criteria. This includes situations in which the hedging instrument expires or is sold, terminated or exercised, or when the risk management objectives initially defined are no longer met.

Only derivatives external to the Group, and internal derivatives that are matched with similar transactions external to the Group, qualify for hedge accounting.

The Group uses the following categories for hedges:

- fair value hedge;
- cash flow hedge;
- net foreign investment hedge.

HEDGE CATEGORIES

Fair value hedge

This is a hedge of exposure to changes in the fair value of an asset or liability recorded in the balance sheet, or a firm commitment to purchase or sell an asset. Changes in the fair value of the hedged item attributable to the hedged component of that item are recorded in profit and loss and offset by corresponding variations in the fair value of the hedging instrument. Only the ineffective portion of the hedge has an impact on profit and loss.

Some loans and financial liabilities, and some commodity contracts, are covered by a fair value hedge. In such cases their balance sheet value is adjusted for changes in fair value attributable to the hedged risks (foreign exchange, interest rate and price risks).

Cash flow hedge

This is a hedge of exposure to variability in cash flows associated with an asset or liability or a highly probable future transaction for which variations in cash flows generated by the hedged item are offset by changes in the value of the hedging instrument.

The effective portion of accumulated changes in the hedging instrument's fair value is recorded in equity, and the ineffective portion (i.e. changes in the fair value of the hedging instrument in excess of changes in the fair value of the hedged item) is recorded in profit and loss.

When the hedged cash flows materialise, the amounts previously recognised in equity are recycled to profit and loss in the same way as for the hedged item, or are treated as an adjustment to the value of the non-financial asset acquired.

Net foreign investment hedge

This is a hedge of exposure to the foreign exchange risk related to a net investment in an entity which does not have the same functional currency as the Group. The effective portion of accumulated changes in the hedging instrument's fair value is recorded in equity until the disposal or liquidation of the net investment, when it is included in the gain or loss on disposal. The ineffective portion (defined in the same way as for cash flow hedges) is recorded directly in profit and loss.

This risk is hedged in the EDF Group level either by matching it with debts in the same currency, or by using derivatives.

Hedging costs: foreign currency basis spread on cross-currency swaps

Hedging costs include the foreign currency basis spread on cross-currency swaps. Fair value variations are included in equity with recycling, and subsequently transferred to interest expenses on financing operations, which are included in the cost of gross financial indebtedness in the income statement.

TRADING DERIVATIVES

Trading derivatives comprise:

- derivatives subscribed for economic hedging that do not qualify as hedges for accounting purposes; changes in the value of these instruments are reported in profit and loss. When the derivatives are used for economic hedging of negotiable debt instruments and purchased bonds, they are included in "Other financial income and expenses". When the derivatives are used for economic hedging of generation and supply operations, they are included in "Net changes in fair value on Energy and Commodity derivatives, excluding trading activities" (see note 6);
- derivatives used in trading activities; changes in the fair value of these instruments are included in sales (see note 5.1).

18.7.1 Breakdown of hedging and trading derivatives

The fair value of hedging and trading derivatives reported in the balance sheet breaks down as follows:

(in millions of euros)	Notes	31/12/2023	31/12/2022
Positive fair value of hedging derivatives	18.1.1	6,166	12,279
Negative fair value of hedging derivatives	18.3.1	(6,762)	(17,965)
FAIR VALUE OF HEDGING DERIVATIVES		(596)	(5,686)
Positive fair value of trading derivatives	18.1.1	14,519	30,566
Negative fair value of trading derivatives	18.3.1	(14,418)	(28,884)
FAIR VALUE OF TRADING DERIVATIVES		101	1,682

The fair value of hedging and trading derivatives by type of risk hedged is shown below:

(in millions of euros)	Notes	31/12/2023	31/12/2022
Hedging derivatives - interest rate risk	18.7.2	997	1,138
Hedging derivatives - foreign exchange risk	18.7.3	795	1,638
Hedging derivatives - commodity risks	18.7.4	(2,388)	(8,462)
FAIR VALUE OF HEDGING DERIVATIVES		(596)	(5,686)
Trading derivatives - interest rate risk	18.7.2	(4)	(28)
Trading derivatives - foreign exchange risk	18.7.3	(72)	(217)
Trading derivatives - commodity risk	18.7.4	177	1,927
FAIR VALUE OF TRADING DERIVATIVES		101	1,682

The fair value of hedging derivatives by type and purpose of hedge is shown below:

(in millions of euros)	Notes	31/12/2023	31/12/2022
Fair value hedges of loans and liabilities		(1,006)	(1,385)
Cash flow hedges of loans and liabilities		2,385	3,409
Sub-total	19.2	1,379	2,024
Fair value hedges of commodity contracts		220	(1,091)
Cash flow hedges of commodity contracts		(2,478)	(6,959)
Sub-total		(2,258)	(8,050)
Net foreign investment hedges		191	173
Fair value hedges of dedicated assets		57	93
Fair value hedges of liquid assets	19.2	35	74
FAIR VALUE OF HEDGING DERIVATIVES		(596)	(5,686)

18.7.2 Interest rate derivatives

The Group is exposed to the risk of fluctuations in interest rates that can affect the value of its loans and financial liabilities, its assets (liquid assets and dedicated assets), and its future financial expenses.

The Group hedges its exposure to changes in the fair value of fixed-rate debts, many of which are converted to floating rates. The derivatives used for these hedges are fixed/floating interest rate swaps and cross-currency swaps, with changes in fair value recorded in profit and loss symmetrically to changes in the value of the hedged debts.

The Group also hedges its floating-rate debt against future changes in interest rates by using floating/fixed interest rate swaps for cash flow hedges.

Details of interest rate derivatives used in a hedging relationship or designated as trading derivatives are shown below:

(in millions of euros)	Notional at 31/12/2023				Notional at 31/12/2022	Fair Value	
	< 1 year	1-5 years	> 5 years	Total	Total	31/12/2023	31/12/2022
Purchases of Caps	6	27	28	61	73	7	10
Interest rate transactions	6	27	28	61	73	7	10
Fixed rate payer/floating rate receiver	2,197	4,890	6,293	13,380	11,278	1,448	1,807
Floating rate payer/fixed rate receiver	915	6,584	17,260	24,759	22,047	(1,176)	(1,713)
Floating rate/floating rate	-	526	3,154	3,680	2,670	79	76
Fixed rate/fixed rate	525	4,806	5,497	10,828	9,192	639	958
Interest rate swaps	3,637	16,806	32,204	52,647	45,187	990	1,128
INTEREST RATE DERIVATIVES - HEDGING	3,643	16,833	32,232	52,708	45,260	997	1,138
Purchase of options	-	-	520	520	552	(11)	(22)
Interest rate swaps	195	76	2,113	2,384	9,549	7	(6)
INTEREST RATE DERIVATIVES - TRADING	195	76	2,633	2,904	10,101	(4)	(28)

The fair value of interest rate/exchange rate cross-currency swaps comprises the interest rate effect only.

The notional value of cross-currency swaps is included both in this note and the note on currency derivatives (see note 18.7.3).

18.7.3 Currency derivatives

The Group is exposed to the risk of exchange rate fluctuations due to the diversification of its businesses, supply contracts in foreign currencies for goods and services, and its geographical locations. These fluctuations can affect the Group's translation differences recognised in equity, balance sheet items, financial expenses, equity and net income.

There are several types of hedged item:

- Liabilities in foreign currencies, for which cross-currency swaps are used in cash flow hedge;
- Financial assets subscribed in foreign currencies;
- Purchases of commodities and fuels, for which the Group hedges the associated foreign exchange risk;
- Net investments in subsidiaries in foreign currencies.

Details of currency derivatives used in a hedging relationship or designated as trading derivatives are shown in the following tables. The notional value of cross-currency swaps is included both in this note and the note on interest rate hedging derivatives (see note 18.7.2).

At 31 December 2023

(in millions of euros)	Notional amount to be received at 31/12/2023				Notional amount to be given at 31/12/2023				Fair value
	< 1 year	1-5 years	> 5 years	Total	< 1 year	1-5 years	> 5 years	Total	31/12/2023
Forward exchange transactions	4,644	639	-	5,283	4,641	629	-	5,270	10
Swaps	32,046	11,920	15,030	58,996	31,773	11,792	14,665	58,230	785
Options	3,371	-	-	3,371	3,426	-	-	3,426	-
CURRENCY DERIVATIVES - HEDGING	40,061	12,559	15,030	67,650	39,840	12,421	14,665	66,926	795
Forward transactions	5,854	3,310	-	9,164	5,815	3,275	-	9,090	54
Swaps	21,767	4,666	2,012	28,445	21,879	4,697	2,018	28,594	(126)
Options	-	-	-	-	-	-	-	-	-
CURRENCY DERIVATIVES - TRADING	27,621	7,976	2,012	37,609	27,694	7,972	2,018	37,684	(72)

At 31 December 2022

(in millions of euros)	Notional amount to be received at 31/12/2022				Notional amount to be given at 31/12/2022				Fair value
	< 1 year	1-5 years	> 5 years	Total	< 1 year	1-5 years	> 5 years	Total	31/12/2022
Forward exchange transactions	4,451	1,010	-	5,461	4,405	964	-	5,369	87
Swaps	25,682	9,303	15,647	50,632	25,257	8,992	14,720	48,969	1,531
Options	-	1,693	-	1,693	-	1,828	-	1,828	20
CURRENCY DERIVATIVES - HEDGING	30,133	12,006	15,647	57,786	29,662	11,784	14,720	56,166	1,638
Forward transactions	9,979	6,281	25	16,285	9,940	6,131	23	16,094	149
Swaps	22,274	7,457	231	29,962	22,484	7,694	225	30,403	(366)
Options	-	-	-	-	-	-	-	-	-
CURRENCY DERIVATIVES - TRADING	32,253	13,738	256	46,247	32,424	13,825	248	46,497	(217)

The notional value of cross-currency swaps shown in this note is also included in the note on interest rate derivatives (see note 18.7.2).

18.7.4 Commodity derivatives

The Group is exposed to price variations on the wholesale markets for energy (electricity, gas, coal, oil products) and the CO₂ emissions quota market with a potentially significant impact on the financial statements.

The Group hedges its forecast sales and purchases of electricity, gas, and coal using futures, forwards, options and swaps, essentially through cash flow hedges.

Details of commodity derivatives used for hedging are as follows:

(in millions of euros)	Units of measure	31/12/2023				31/12/2022		
		Net notional				Net		
		< 1 year	1-5 years	> 5 years	Total	Fair value	notional	Fair value
Electricity	TWh	8	9	-	17	(1,745)	16	(3,619)
Gas	Millions of therms	420	230	-	650	(636)	273	(4,999)
Oil products	Thousands of barrels	6,005	640	-	6,645	-	12,044	96
CO ₂	Thousands of tonnes	1,680	682	-	2,362	(7)	4,136	60
Other commodities							-	-
COMMODITY DERIVATIVES - HEDGING						(2,388)		(8,462)

The negative fair value of commodity derivatives used for hedging at 31 December 2023 (€(2.4) billion) is mainly explained by the change in the market price/contractual exercise price spread on electricity and gas hedging instruments and the change in commodity prices in 2023.

Details of commodity derivatives used for trading are as follows:

(in millions of euros)	Units of measure	31/12/2023		31/12/2022	
		Net notional	Fair value	Net notional	Fair value
Electricity	TWh	(18)	1,213	(13)	(1,090)
Gas	Millions of therms	(3,623)	(1,071)	(2,497)	2,990
Oil products	Thousands of barrels	(746)	(73)	4,065	46
CO ₂	Thousands of tonnes	(4,429)	21	(1,417)	(28)
Coal and freight	Millions of tonnes	(1)	83	(1)	15
Other commodities		-	4	-	(6)
COMMODITY DERIVATIVES - TRADING			177		1,927

These instruments mainly include contracts included in EDF Trading's portfolio.

18.7.5 Impact of hedging derivatives on comprehensive income

Changes in the fair value of hedging derivatives included in equity (EDF share) and profit and loss :

(in millions of euros)	2023			2022		
	Gross changes in fair value recorded in equity ⁽¹⁾	Gross changes in fair value transferred to income - Recycling ⁽²⁾	Gross changes in fair value transferred to income - Ineffectiveness	Gross changes in fair value recorded in equity ⁽¹⁾	Gross changes in fair value transferred to income - Recycling ⁽²⁾	Gross changes in fair value transferred to income - Ineffectiveness
Interest rate hedging ⁽⁴⁾	(202)	-	6	392	-	(1)
Exchange rate hedging	(1,069)	(335)	12	2,653	598	92
Net foreign investment hedging	(107)	-	-	308	-	-
Commodity hedging	4,833	(3,066)	(8)	(9,002)	(3,131)	(2)
HEADING DERIVATIVES⁽³⁾	3,455	(3,401)	10	(5,649)	(2,533)	89

⁽¹⁾ +/(): increase/(decrease) in equity (EDF share).

⁽²⁾ +/(): increase/(decrease) in net income (EDF share).

⁽³⁾ Excluding associates and joint ventures.

⁽⁴⁾ Gross changes in fair value recorded in equity in 2022 include €(126) million of changes in the fair value of hedging costs resulting from the foreign currency basis spread on and cross-currency swaps. These changes are transferred to profit and loss via interest expenses on financing operations, which are included in the cost of gross indebtedness in the income statement (see note 8.1).

The gross change in the fair value of hedging instruments recognised in equity (EDF share), including recycling, is €6 856 million in 2023 (€(3,116) million in 2022).

In 2023 this change is explained by the gross fair value changes in net foreign investment hedges, amounting to +€(107) million (+€308 million in 2022), interest rate, exchange rate and commodity hedges, amounting to €7,089 million (€(3,579) million in 2022) and hedging costs associated with the foreign//cross currency basis spread on interest rate swaps and cross-currency swaps, amounting to €(126) million in 2023; see the consolidated statement of comprehensive income.

The amount transferred to operating profit before depreciation and amortisation in 2023 is €(3,066) million in respect of commodity hedges comprises:

- €(1,974) million for gas hedging contracts, concerning the France - Generation and supply and United Kingdom segments,
- €(1,034) million for electricity hedging contracts, concerning the France - Generation and supply and United Kingdom segments,
- €(58) million for other hedging contracts.

18.7.6 Offsetting of financial assets and liabilities

ACCOUNTING PRINCIPLES AND METHODS

A financial asset and financial liability must be netted if the entity currently has a legally enforceable right to do so and intends either to settle the net amount or to realise the asset and settle the liability simultaneously.

At 31 December 2023

	As reported in balance sheet	Balance without offsetting	Balance with offsetting under IAS 32		Amounts covered by a general offsetting agreement but not offset under IAS 32			
			Gross amount recognised (before offsetting)	Gross amount offset under IAS 32	Net amount recognised after offsetting under IAS 32	Financial instruments	Fair value of financial collateral	Net amount
(in millions of euros)								
Fair value of derivatives – assets	20,685	9,618	17,835	(6,768)	11,067	(1,504)	(2,718)	6,845
Fair value of derivatives – liabilities	(21,180)	(8,554)	(19,394)	6,768	(12,626)	1,504	3,974	(7,148)

At 31 December 2022

	As reported in balance sheet	Balance Without offsetting	Balance with offsetting under IAS 32		Amounts covered by a general offsetting agreement but not offset under IAS 32			
			Gross amount recognised (before offsetting)	Gross amount offset under IAS 32	Net amount recognised after offsetting under IAS 32	Financial instruments	Fair value of financial collateral	Net amount
(in millions of euros)								
Fair value of derivatives – assets	42,845	4,493	76,159	(37,807)	38,352	(3,548)	(7,289)	27,515
Fair value of derivatives – liabilities	(46,849)	(5,533)	(79,123)	37,807	(41,316)	3,548	7,503	(30,265)

Note 19 Financial indicators

The financial indicators are not defined by the accounting standards and are not directly visible in the Group's financial statements. The principal financial indicators are the following.

19.1 Net income excluding non-recurring items

Net income excluding non-recurring items corresponds to the Group's share of net income (EDF net income) excluding non-recurring items, net changes in the fair value of energy and commodity derivatives (excluding trading activities), and net changes in the fair value of debt and equity instruments, net of tax.

The following tables show the transition from EDF net income to net income excluding non-recurring items:

At 31 December 2023

(in millions of euros)	Notes	2023			EDF net income
		Gross value	Income taxes	Non-controlling interests	
Net income					10,016
Changes in the fair value of debt and equity instruments⁽¹⁾		(2,236)	577	6	(1,653)
Net changes in fair value on Energy and Commodity derivatives, excluding trading activities	6	(363)	100	-	(263)
Impairment		13,251	(2,238)	(2,763)	8,250
- impairment of tangible and intangible fixed assets ⁽²⁾	10.8.1 and 10.8.2	13,011	(2,230)	(2,762)	8,019
- impairment of investments in associates and joint ventures ⁽³⁾	12.3	240	(8)	(1)	231
Other items		2,955	(752)	(72)	2,131
- other operating income and expenses	7	2,944	(752)	(72)	2,120
- other		11	-	-	11
NET INCOME EXCLUDING NON-RECURRING ITEMS					18,481

⁽¹⁾ Including fair value hedges of dedicated assets.

⁽²⁾ In 2023, this impairment notably concerns EDF Energy (€(12,871) million).

⁽³⁾ In 2023, this impairment principally concerns dedicated assets (€(86) million), the Neart na Gaoithe (NNG) project in the United Kingdom (€(54) million) and wind farms in Mexico (€(16) million).

The net income excluding non-recurring items amounts to €18,481 million at 31 December 2023, up by €31,143 million compared to 2022.

At 31 December 2022

(in millions of euros)	Notes	2022			EDF net income
		Gross value	Income taxes	Non-controlling interests	
Net income					(17,940)
Changes in the fair value of debt and equity instruments⁽¹⁾		3,160	(822)	(12)	2,326
Net changes in fair value on Energy and Commodity derivatives, excluding trading activities	6	849	(227)	-	622
Impairment		1,905	(132)	(478)	1,295
- impairment of tangible and intangible fixed assets ⁽²⁾	10.8.1 and 10.8.2	1,762	(121)	(478)	1,163
- impairment of investments in associates and joint ventures ⁽³⁾	12.3	143	(11)	-	132
Other items		858	181	(4)	1,035
- other operating income and expenses	7	687	(141)	(4)	542
- provisions for financial risks on equity investments		187	-	-	187
- expenses related to tax litigation		-	322	-	322
- other		(16)	-	-	(16)
NET INCOME EXCLUDING NON-RECURRING ITEMS					(12,662)

⁽¹⁾ Including fair value hedges of dedicated assets.

⁽²⁾ In 2022, this impairment notably concerns goodwill at EDF Energy (€(1,176) million), wind farms in the United States and Mexico (€(129) million) and impairment of land in the United Kingdom (€(120) million).

⁽³⁾ In 2022, this impairment principally concerns wind farms in the United States (€(139) million).

19.2 Net indebtedness

Net indebtedness comprises total loans and financial liabilities, less cash and cash equivalents and liquid assets. Liquid assets are financial assets consisting of funds or interest rate instruments with initial maturity of over three months that are readily convertible into cash and are managed according to a liquidity-oriented policy.

Net indebtedness are as follows:

(in millions of euros)	Notes	31/12/2023	31/12/2022
Loans and other financial liabilities	18.3.2	86,647	96,053
Derivatives used to hedge liabilities	18.7.1	(1,379)	(2,024)
Cash and cash equivalents	18.2	(10,775)	(10,948)
Debt and equity securities – liquid assets	18.1.2	(20,077)	(18,507)
Derivatives hedging liquid assets	18.7.1	(35)	(74)
NET INDEBTEDNESS		54,381	64,500

The Group's net indebtedness amounts to €54,381 million at 31 December 2023 (€64,500 million at 31 December 2022).

Note 20 Climate-related matters relevant to the financial statements

Introduction and background

In accordance with EDF's *raison d'être*: **"To build a net zero energy future with electricity and innovative solutions and services, to help save the planet and drive well-being and economic development"**, the Group has defined 16 Corporate Social Responsibility (CSR) commitments focusing on four issues - Carbon neutrality and the climate, Preserving the planet's resources, Well-being and solidarity, and Responsible development. The commitments are transposed into the functions and investment projects with the help of an assessment grid.

These commitments and their implementation in the Group are also managed and monitored by several governance bodies, under the supervision of the Board of Directors (see section 3.5.2 of the 2022 Universal Registration Document "CSR governance bodies").

On 10 December 2021 the European Union adopted article 8 of European regulation 2020 - 852 which aims to classify economic activities based on their contribution to the achievement of environmental objectives. This **"Taxonomy regulation"** is part of the European strategy to promote emergence of sustainable finance that contributes to attainment of carbon neutrality by 2050, particularly by encouraging capital inflows into sustainable investments. It was supplemented by a specific Delegated Act for nuclear and gas activities, published on 2 February 2022 and applicable from 2022. The information and indicators contained in this regulation (proportion of sales, capital expenditure and operating expenditure associated with eligible activities and aligned with the European taxonomy) are described in section 3.8.4 of the 2022 Universal Registration Document, "Details on the taxonomy". See note 20.4 below presents the amount of taxonomy-aligned CAPEX.

The **Group's financial statements** incorporate issues relating to climate change and sustainable development at different levels, as summarised below. Those issues are taken into consideration through the Group's investment and divestment strategy, introduction of sustainable financing, specific expenditure incurred in response to environmental challenges, particularly under applicable laws and regulations, and mobilising Group executives to engage with climate issues, and also through the valuation methods used for the Group's assets and liabilities.

Themes	Notes	Content
Regulatory mechanisms related to greenhouse gas emission rights, Energy Savings Certificates, Renewable Energy Certificates - see note 20.1	Note 5.5.4 "Other items" Note 10.2 "Other intangible assets" Note 17.2 "Other provisions"	Climate and environmental issues are addressed in compliance with the regulatory systems existing in different countries for greenhouse gas emission rights, renewable energy certificates and energy savings certificates. These systems have an impact on the Group's financial statements at several levels: the income statement and the balance sheet.
Nuclear provisions and provisions for contingencies and losses incorporating environmental risks - see note 20.2.1	Note 15 "Provisions related to nuclear generation and dedicated assets" Note 17 "Other provisions and contingent liabilities"	These are provisions relating to: - nuclear generation, comprising provisions for the back-end of the cycle (spent fuel management and long-term radioactive waste management), provisions for plant decommissioning, and provisions for last cores; - environmental measures; - environmental litigations.
Valuation of assets - see note 20.2.2	Note 10.8 "Impairment/reversals"	Climate issues are addressed in impairment tests, notably through the long-term scenarios applied for electricity prices in line with the trajectories of European decarbonisation objectives
Sustainable finance - see note 20.3	Note 18.3.2 "Loans and other financial liabilities" Note 14.3 "Perpetual subordinated bonds" Note 18.4 "Unused credit lines"	The Group has made several finance issues indexed on environmental indicators or to advance CSR projects: <i>Green bonds</i> , <i>Social bonds</i> and credit lines indexed on ESG criteria
Expenses for protection of the environment and the climate - see notes 20.4, 20.5 and 20.6	Note 10.2 "Other intangible assets"	The Group devotes a significant portion of its research and development budget to decarbonisation and the energy system transition, and undertakes other expenses for the environment or to adapt its installations to changes in the climate. The accounting policies applicable to research and development expenses are described in note 10.2.

20.1 Regulatory expenses

20.1.1 Greenhouse gas emission trading systems

EU Emissions Trading System (EU ETS)

The European Union's Emissions Trading System (SEQE-UE or EU ETS) exists to fight climate change and reduce greenhouse gas emissions.

This system, which applies in all EU countries, sets an annual cap on emissions. Businesses (including EDF) receive or buy emission quotas, then the following year surrender to the European Commission a number of greenhouse gas emission certificates corresponding to their Scope 1 emissions for the year elapsed, such as direct greenhouse gas emissions from production of the goods sold (e.g. electricity, heat, steel, paper, etc.). Fines are payable if there is a shortfall (€100 per tonne of CO₂ not covered by quotas, and an obligation to cover these amounts by quota the following year).

The cap is being progressively reduced in order to bring down the total emissions in Europe.

The legislative framework of the EU-ETS for the fourth trading period (2021 - 2030) has been tightened up to achieve the emission reduction targets set in the 2030 Climate and Energy framework, and the EU's contribution to the Paris Climate Agreement adopted in 2015 (which set a general target of a 40% cut in emissions compared to 1990 levels for the whole EU)⁽¹⁾. One key step was accelerating annual quota reductions to 43 million tonnes per year (2.2% below the allocations for 2010).

As part of the Fit for 55 package of legislation, the European Commission adopted laws in April 2023 raising the target for cuts in CO₂ emissions to at least 62% by 2030 for sectors concerned by the Emissions Trading System. The new rules also introduce a reduction in the number of quotas automatically allocated to each company concerned by the Emissions Trading System.

Having halved its direct CO₂ emissions between 2017 and 2022, the Group has set itself new targets for 2025, 2030 and 2035, defining an ambitious short and medium-term trajectory to achieve a carbon-free electricity mix (see the Group press release of 28 November 2023):

- a 60% reduction (compared to 2017) in its scope 1 emissions by 2025;
- a 70% reduction in its scope 1 emissions, and carbon intensity of 30gCO₂/kWh, by 2030;
- an 80% reduction in its scope 1 emissions, and carbon intensity of 22gCO₂/kWh, by 2035.

In the EDF group, the entities concerned by application of these European regulations are EDF, Edison, Dalkia, PEI and Luminus.

The volume of emissions at 31 December 2023 stood at 14 million tonnes (18 million tonnes for 2022).

Actual greenhouse gas emissions amounted to €531 million at 31 December 2022 (€799 million at 31 December 2022) and are included in provisions.

In 2023, the Group surrendered 18 million tonnes in respect of emissions generated in 2021 under the EU ETS (in 2022 it surrendered 17 million tonnes in respect of emissions generated in 2021).

British Emissions Trading Scheme (UK ETS)

The United Kingdom has set up its own system (UK ETS - Emissions Trading Scheme). The UK ETS, which uses a bidding system, covers the same sectors as the EU ETS and operates under generally similar rules, with comparable accounting treatment.

The volume of EDF Energy's emissions at 31 December 2023 stood at 4 thousand tonnes (0.1 million tonnes for 2022). Actual greenhouse gas emissions amounted to €0.4 million at 31 December 2023 (€9 million at 31 December 2022) and are included in provisions in the balance sheet.

In 2023, EDF Energy surrendered 0.1 million tonnes in respect of emissions generated in 2022 under the UK ETS (in 2022 it surrendered 2 million tonnes in respect of emissions generated in 2021).

Accounting treatment of CO₂ emission certificates

Emission certificates acquired to comply with the regulatory requirements on greenhouse gas emissions are recorded in intangible assets.

At the year-end a provision corresponding to the emissions is established, equal to the acquisition cost up to the amount of certificates acquired on the spot or forward markets, and to market prices for the balance. This provision is cancelled when the certificates are surrendered to the State.

20.1.2 Renewable energy certificates (green certificates)

In application of EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources, every EU member state has set national targets for consumption of electricity from renewable sources. The United Kingdom has its own equivalent system.

Guarantee of Origin certificates prove the renewable origins of this electricity, which transits through the grid. They are sold by operators of renewable energy plants and bought by customers who want to use renewable-source electricity.

There are two systems for States to meet their targets:

- setting a specific sales tariff for renewable energies (this is the approach taken in France);
- setting an obligation for electricity producers to surrender a certain volume of renewable energy certificates (as is the case in the United Kingdom, Italy and Belgium).

⁽¹⁾ The current EU ETS allocations trajectory does not yet include changes to be made in application of the Fit for 55 package.

The renewable energy certificate system may apply to:

- non-obligated electricity producers when the obligation applies to sales (EDF Renewables);
- obligated electricity producers when the obligation applies to generation;
- electricity producers who are also sellers of electricity when the obligation applies to energy sales (EDF Energy, Edison and Luminus).

At 31 December 2023, a provision of €1,176 million was booked in connection with the obligation to surrender renewable energy certificates at that date, essentially concerning EDF Energy (United Kingdom) and Luminus (Belgium). For reminder, a large portion of these obligations is covered by purchases of certificates included in intangible assets (see note 10.2).

Accounting treatment of green certificates

For the entities that produce and sell electricity:

- certificates earned through energy generation are not recognised, since their cost is nil;
- certificates purchased are recognised as intangible assets in the line “Greenhouse gas emission certificates – green certificates”.

A provision is also established to reflect the obligation to surrender certificates. It is based on the cost of certificates earned (with nil value) and purchased (on the spot or forward market), the market price of the certificates still to be purchased, and where relevant the market price or penalty price for the balance. This provision is cancelled when the certificates are surrendered to the State.

20.1.3 Energy savings certificates

In all its subsidiaries, the Group is engaged in a process to control its energy consumption through various legislative measures in application of European Union Directives and national laws.

In France, the Law of 13 July 2005 introduced a system of energy savings certificates, imposing energy savings obligations on suppliers of energy (electricity, gas, heat, cold, domestic fuel oil and fuel for vehicles) with sales above a certain level. At the end of the period concerned, obligated actors are required to present energy savings certificates that correspond to their obligatory energy savings, otherwise sanctions apply. These certificates are obtained in return for energy savings operations conducted directly or indirectly, or purchased from other obligated or “eligible” economic actors.

For the fifth period, which began on 1 January 2022 and will end on 31 December 2025, the obligation has been raised significantly and major regulatory changes apply to households from 1 January 2024, particularly for energy-efficient home renovations. As a result of these new measures, actors concerned by the system are having to partly reconsider their model for obtaining energy savings certificates.

To meet this obligation, three sources are available to the EDF group: supporting consumers undertaking energy efficiency operations (in 2023, for example, 234,000 renovation projects were completed), funding State-approved energy savings programmes, and purchasing certificates from eligible actors.

In the United Kingdom, EDF Energy voluntarily helps companies explore and develop solutions by enabling them to save energy, carbon and costs, particularly through its Powershift flexibility platform.

Accounting treatment of energy savings certificates

Expenses incurred for energy savings certificates are recorded in expenses of the year concerned, in “Other operating income and expenses”. Expenses in excess of the accumulated obligation at the year-end are included in inventories and the stocks of energy savings certificates may be used to cover the obligation in later years.

A provision is recognised if the volume of certificates earned is lower than the accumulated energy savings obligation at the year-end. The amount of the provision is equal to the cost of actions still to be taken to extinguish the obligations related to the energy sales made.

20.2 Valuation of assets and liabilities

20.2.1 Provisions relating to environmental issues

Most of these provisions are provisions related to nuclear generation, which comprise provisions for back-end nuclear cycle expenses (management of spent fuel and radioactive waste), provisions for plant decommissioning and provisions for last cores. Obligations can vary noticeably depending on each country's legislation and regulations, and the technologies and industrial scenarios involved. Details of these provisions are provided in note 15 concerning EDF SA and EDF Energy.

They also include provisions for environmental schemes including provisions for greenhouse gas emission certificates, renewable energy certificates and energy savings certificates. At 31 December 2023, these provisions totalled €1,707 million (€1,926 million in 2022, see note 17.2).

Contingent liabilities also exist in connection with environmental litigation, described in note 17.3.5, such as the litigation following the sale of Ausimont (the Bussi site) to Solvay by Edison in 2002.

20.2.2 Valuation of assets

In valuing the Group's long-term assets, climate issues are taken into account through impairment testing. The long-term scenarios used for electricity prices in countries where the Group does business are consistent with the trajectories of European decarbonisation targets, particularly as set in the Paris climate agreement. As explained in note 10.8, in constructing long-term electricity prices, the impact of climate contingencies is incorporated into assumptions concerning demand (particularly energy requirements for heating, and summer comfort), generation of renewable energies (onshore and offshore wind power, solar power) for all European countries, the contribution of hydropower, and environmental tax cuts for nuclear power generation in France. Climate time series analyses are based on the European EUROCORDERX model and include the impact of climate change. A deliberately prudent approach is adopted to avoid any bias towards underestimation of the practical effects of climate change on the relevant physical quantities such as temperatures, cloud coverage and wind speeds and ultimately on the European electricity system between 2028 and 2050. Scenarios also take account of the objectives of public energy and climate policies such as *Fit For 55* and *RepowerEU* at European Union level, or the National Low Carbon Strategy (*Stratégie Nationale Bas Carbone*) in France. The scenarios used mainly include high CO₂ prices supporting carbon-free electricity production in Europe, and a lower-carbon economy more generally through electrification of uses.

The impairment tests at 31 December 2023 are thus based on CO₂ prices (in 2022 euros) of €130/t for 2030, €165/t for 2040 and €200/t for 2050.

The Group controls and operates thermal (gas-fired, coal-fired, oil-fired) electricity generation plants principally in France and Italy, to a smaller extent in Brazil, in Laos and Belgium, and to a now marginal degree in England (since the sale of West Burton B in 2021). The net book value of the assets concerned is €5.2 billion at 31 December 2023 (€5 billion at 31 December 2022), including €3.2 billion for assets in France and €1.4 billion for assets in Italy (€3.6 billion for assets in France and €1.0 billion for assets in Italy at 31 December 2022). The operating lifetimes of these plants take account of the Group's current emission reduction commitments, and local regulations.

In **mainland France**, the electricity generated by EDF's fleet of thermal power plants (CCGT, CT, and coal), with net book value of €1.6 billion at 31 December 2023 (€1.8 billion at 31 December 2022) accounted for around 1.86% of EDF's total electricity output in 2022. These plants operate in semi-baseload and peak periods and are used to variable degrees throughout the year, playing a significant role in system security when there are tensions in the supply-demand balance, which was the case during the winter of 2022.

Coal-fired generation in France is to end in application of the Multi-year energy programme. The Cordemais plant, with a net book value of €0.1 billion, is due to cease operations in 2026 at the latest (its operating lifetime has been extended by the French government). The Decree of 14 September 2022 which temporarily modified the greenhouse gas emissions caps for fossil-fuelled electricity generation requires a carbon offset fund to be established in return for the additional authorised hours of operation. This fund will meet EDF's carbon offsetting obligations for the additional hours of operation by the Cordemais coal-fired units and CT units for the next two winters, for the payment of €40/t CO₂.

EDF is modernising its fleet of natural gas CCGT plants (Blénod, Martigues, Bouchain) to reduce air emissions of CO₂, NO_x and SO₂. The Bouchain plant in particular produces CO₂ emissions of around 360g/kWh on average. This fleet of plants has a net book value of €1.1 billion, and their operating lifetimes are due to end between 2036 and 2041.

In the **island territories**, electricity is principally generated by an oil-fired fleet with net book value of €1.6 billion at 31 December 2023 (€1.8 billion at 31 December 2022), and to a smaller degree hydroelectric and other renewable energy plants. On 4 October 2023, EDF announced that it would be moving to carbon-free electricity generation for all island territories under its responsibility by 2033, by converting the thermal power plants presently located there so they can be run on bioliquid instead of fossil fuels (the Port Est plant was converted to liquid biomass on 4 December 2023).

In **Belgium**, Luminus has a thermal fleet made up of several power plants (both combined cycle and open cycle). The project of building a new CCGT plant at Seraing was selected under the Capacity Remuneration Mechanism (CRM). This new plant will be a gas-steam turbine (GST) type plant with total capacity of approximately 870MW. Work started in autumn 2022 and commissioning of the new unit is scheduled for the second half of 2025.

In **Italy**, Edison's thermal fleet consists of 14 CCG plants. In keeping with the "National plan for energy and the climate" supporting development of gas-based electricity generation and its integration with renewable energy generation, Edison commissioned the first new-generation CCG plant at the Marghera Levante site (780MW) in July 2023, and a 760MW greenfield project at Presenzano in November 2023, using the same technology, with a more moderate environmental impact (CO₂ emissions 40% below the national average, and a 70% reduction in NO_x emissions). The combined net book value of these two plants is €1.4 billion, and they account for approximately 65% of the total net book value with an operating lifetime currently set at 25 years. The operating lifetimes of the other CCG plants are currently scheduled to end before 2037.

20.3 Sustainable financing

20.3.1 Green Bonds

Since 2013 the Group has made eleven Green Bond issues for a value equivalent to €11.3 billion. Nine of these bonds, totalling €7.5 billion, were still outstanding at 31 December 2023 (see note 18.3.2.2). The Group's financing framework for green bonds (the Green Bond Framework) includes financing of new wind and solar power projects, investments to renovate and modernise its hydropower assets in mainland France and internationally, energy efficiency projects, and biodiversity protection projects.

In July 2022, it was renamed the Green Financing Framework, because it covers all of EDF's "green" financing operations. Its scope of application has been broadened by adding two new categories: distribution networks and nuclear generation assets, and eligible projects meet the European Taxonomy criteria. The Green Financing Framework was reviewed by an independent body which confirmed that it respects best practices on the Green Loan market (the Green Loan Principles, published by the Loan Syndications and Trading Association).

EDF has issued several green bonds to finance distribution networks; a first green bond dedicated to financing the existing nuclear fleet was issued on 28 November 2023 and totalled €1 billion.

Allocation of the funds raised by EDF's Green Bond issues is certified by one of the statutory auditors (see section 6.7 of the Universal Registration Document). This certification can be consulted on the EDF website's sustainable development page.

20.3.2 Social bonds (social hybrid notes)

On 26 May 2021 EDF launched an issue of Euro-denominated perpetual social hybrid notes with total nominal value of €1.25 billion.

The funds raised were used to finance eligible projects, as defined in the EDF group's Social Bond Framework. These projects include investment expenditure by EDF in Small and Medium-Sized Enterprises (SMEs) that contribute to the development and maintenance of electricity generation and distribution assets in Europe (including the United Kingdom).

The Social Bond Framework's compliance with the Social Bond Principles published by the International Capital Markets Association (ICMA) has been validated by an independent body.

20.3.3 Bilateral green loan

On 18 November 2022 EDF and Crédit Agricole CIB signed a €1 billion bilateral green loan that complies with EDF's Green Financing Framework. This loan will contribute to the *Grand Carénage* programme to enhance safety and extend the operating lifetime of French nuclear reactors beyond 40 years. The funds will be entirely dedicated to maintenance of French power plants, in order to continue production of very low-carbon energy (4g CO₂ equivalent per kWh over the life cycle⁽¹⁾).

20.3.4 Credit lines indexed on ESG criteria

The EDG group has 23 renewable bilateral credit lines and two syndicated credit facilities indexed on the Group's sustainable development performance (incorporating a cost adjustment mechanism for financing costs):

- a €4 billion 5 - year "green" syndicated credit line with more than 20 banks. The margin is adjusted based on the Group's performance on three environmental KPIs;
- a €1.5 billion 5 - year "social" credit facility with 9 banks. The margin is adjusted based on the Group's performance on four KPIs focusing on EDF's Fair and Inclusive Transition principles;
- 21 renewable bilateral credit lines indexed on ESG criteria. The margins are adjusted based on the Group's performance on KPIs selected with the banks.

At 31 December 2023, undrawn ESG-indexed renewable credit lines (including syndicated credit facilities) totalled over €11.2 billion, or 71% of the EDF group's total undrawn credit lines (see note 18.4). In 2023, the Group respected the required indicators.

20.4 Carbon-free investments

In 2023, the Group continued its programme of gross operating investments, which amounted to €21.4 billion and included €19.2 billion of gross investments in intangible assets and property, plant and equipment (see notes 4 and 10.7) and €0.9 billion of gross financial investments.

In 2023, nearly 95% of the Group's investments were in line with its net-zero trajectory (94% in 2022), with 53% of investments concerning the nuclear sector (50% in 2022). 64% of the Group's investments were aligned with the current European Taxonomy at 31 December 2023 (compared to 66% for 2022 including the effects of the complementary delegated act on nuclear and gas activities). This notably covered investments in nuclear activities in France, networks, renewable energy generation facilities (solar power, wind power), hydropower facilities and certain energy services.

(1) Source : *Analyse Cycle de Vie du kWh nucléaire d'EDF* published by EDF in 2022 and reviewed by independent experts https://www.edf.fr/sites/groupe/files/2022-11/edfgroup_acv-4_plaquette_2022111_en.pdf

EDF promotes innovation to contribute to achievement of the net zero objective, by investing in startups and venture capital funds dedicated to innovation (the EDF Pulse Ventures programme), and by developing intrapreneurial projects (the EDF Pulse Incubation programme). The Group has formed several subsidiaries for these purposes, such as Hynamics, a company that produces and sells low-carbon hydrogen produced by water electrolysis to meet the needs of the heavy-duty transport industry.

The Group's raison d'être is also expressed in the management policy for its portfolio of dedicated assets held to finance long-term nuclear expenses in France (realisable value of €36.9 billion at 31 December 2023), and its responsible investor's charter introduced in 2020, which has three focal points (compliance with the United Nations' Principles for Responsible Investment; respect of the major international agreements on human rights; and annual reporting on responsible investments). This charter is applicable both to assets managed directly and assets managed by specialist companies under delegated management arrangements.

In 2023, a review was conducted of these delegated management companies' compliance with the United Nations' Principles for Responsible Investment and the major international agreements, and for climate risks, a carbon emission assessment was established for listed and unlisted assets. The climate scenarios incorporated into risk/return studies of dedicated assets were analysed in accordance with the recommendations of the NGFS (Network for Greening the Financial System), to assess the risk of nuclear provisions being underfunded in the event of a climate stress scenario that could affect the value of dedicated assets, depending on different time horizons.

For unlisted assets, EDF is committed to integrating environmental, social and governance (ESG) considerations, notably by encouraging its partners and the management of directly-owned assets to introduce carbon reviews, define net-zero emission objectives for 2050 and action plans to achieve them, and undertake a climate risk assessment.

20.5 Expenses for protection of the environment and the climate, and to adapt installations to climate change

The Group is continuing its commitments to address environmental issues, for example through the following actions.

20.5.1 Research and development (R&D)

Given the goal of carbon neutrality by 2050, and the fact that electricity is a major lever in action to decarbonise the French economy, R&D has a crucial role to play in the electricity, climate, digital and societal transition.

In 2023, the EDF group's total R&D budget amounted to €706 million, comprising €512 million for EDF's R&D, and separate R&D by certain subsidiaries, principally Framatome, EDF Energy and Edison.

In France, 99% of EDF's R&D budget is dedicated to achieving the net zero goal, and the energy system transition.

The R&D budget is particularly channelled into research into energy efficiency, uses of electricity as a substitute for fossil fuel-based energies, renewable energies and their insertion into the grid, energy storage and production, carbon-free hydrogen and its applications for decarbonising the economy, sustainable cities, the local impacts of climate change and other environmental issues such as biodiversity, water quality, and the mitigation of all forms of pollution.

Research concerning electricity storage, enhancement of energy performance diagnosis methods, improvement of techniques for urban heating and cooling networks, platforms for sharing studies relevant to the ecological transition, and increasing safety at nuclear power plants is supported by public subsidies, notably from the European Union.

The CAP 2030 Decarbonised Thermal Project, launched in March 2021, aims to give each of the Group's thermal fleets a decarbonisation strategy for existing assets and a development strategy for new decarbonised assets, with a roadmap to guarantee the availability of such decarbonised thermal generation facilities at the appropriate time, for good control of the related technologies and skills. All the EDF Group's gas activities thus follow carbon trajectories (covering both direct and indirect emissions) set for each entity in line with the Group's 2030, 2035 and 2050 objectives.

20.5.2 Other expenses for protection of the environment and climate

ACCOUNTING PRINCIPLES AND METHODS

Other expenses for protection of the environment and climate are identifiable expenses incurred to prevent, reduce or repair damage that has been or may be caused by the Group as a result of its activities. These expenses are treated as follows:

- they are capitalised if they are incurred to prevent or reduce future damage or protect resources (e.g. expenses for structures to facilitate the passage of migrating fish, effluent treatment installations, etc.);
- they are booked as environmental liabilities and increases to provisions for environmental risks if they correspond to an obligation that exists at the year-end and it is probable or certain at the reporting date that they will lead to an outflow of resources;
- they are recognised as expenses if they are operating expenses for the units in charge of environmental concerns, environmental supervision, environmental duties and taxes, processing of liquid and gas effluents and non-radioactive waste, or research unrelated to an investment.

All of the Group's functions, employees, activities and projects are mobilised to fulfil EDF's objective of being an environmentally responsible company. Some of the actions concerned are presented below.

Action for biodiversity

The EDF group has been committed to action for biodiversity since 2006 with a dedicated policy, and today its biodiversity ambitions are reflected in formal commitments made through two initiatives, *Entreprises engagées pour la nature* (Committed companies for nature) and "Act4nature international". These voluntary commitments cover some twenty actions to reduce contributions to major pressure points on biodiversity (as identified by IPBES, the biodiversity equivalent of the IPCC), recreate biodiversity-friendly spaces and conditions, further improve and share knowledge, strengthen biodiversity governance and raise employee awareness.

In addition to these commitments, between 2013 and 2023, the Group undertook more than 70 operations through EDF hydro and its hydropower activities for a cumulative total investment of €107 million (including subsidies received), to facilitate fish migration at ecologically sensitive sites in mainland France ("list 2" sites for the purposes of the "national law on water and aquatic environments"), installing fish passes and fish ladders and removing river weirs.

20.5.3 Expenses to adapt the Group's assets to climate change

To adapt France's current and future nuclear power plants, in addition to work on safety and security in compliance with regulations and safety authority recommendations, EDF has established a plan to adapt its facilities and their operations. The ADAPT project is part of a systemic approach for analysing the resilience of all ecosystems, natural or socio-economic, which are decisive for generation capacity.

This project sees climate change as systemic and changing. Among other things, these analyses are a basis for:

- imagining the climate futures of different areas and regions over different time horizons;
- improving the level of protection for the group's installations against unforeseeable natural events, through better quantification of their extreme versions;
- reducing the environmental impact of the Group's facilities;
- identifying innovative solutions, for example for recovering evaporated water from cooling towers, and testing the most promising ideas on site in the near future.

The increasing pace of climate change is also leading the Group to reinforce its R&D and engineering capacities, by increasing the number of people hired with key skills in all the related areas: climatology, hydrogeology, environmental matters, and of course technical engineering.

20.6 Mobilisation of Group executives on climate issues

Climate performance-related remuneration for Group executives

In line with EDF's aim to promote integrated performance based on both finance and CSR, the annual variable salary of the Group's senior executives also depends on financial and CSR performance. The CSR performance criteria, which can represent up to 15% of these executives' variable remuneration, consist of a climate criterion (based on carbon intensity) and two social criteria (total Lost Time Incident Rate (LTIR) and the commitment index).

For certain executives, the long-term remuneration (3-year plan) also depends on financial performance plus the following CSR criteria: the rating given by the CDP agency (climate and water) and the percentage of women on the Management Committees and female executives at Group level. These two criteria account for 20% of the variable remuneration.

Vehicle fleet electrification

As the first French Group to sign the EV100 initiative, EDF made a commitment to have a fully-electric light vehicle fleet by 2030. By the end of 2022 the worldwide fleet numbered more than 47,000 light vehicles (especially in Europe) and 29.3% were already electric (over 13,700 electric vehicles, an increase of more than 3,400 from 2022). Joining the EV100 initiative is also an encouragement for Group employees to control their energy consumption and reduce their carbon footprint, as it gives them access to competitive offers from car suppliers and offers for recharging services sold by EDF group subsidiaries.

For 2022, the vehicle fleet electrification indicator accounted for 10% of EDF SA's and Enedis' profit-sharing criteria.

Note 21 Off-balance sheet commitments

This note presents off-balance sheet commitments given and received by the Group at 31 December 2023. The amounts of commitments correspond to non-discounted contractual values.

21.1 Commitments given

The table below shows off-balance sheet commitments given by the Group that have been valued. Other commitments are described separately in the detailed notes.

(in millions of euros)	Notes	31/12/2023	31/12/2022
Operating commitments given	21.1.1	64,201	61,990
Investment commitments given	21.1.2	17,605	16,900
Financing commitments given	21.1.3	6,043	6,345
TOTAL COMMITMENTS GIVEN		87,849	85,235

In almost all cases, these are reciprocal commitments, and the third parties concerned are under a contractual obligation to supply the Group with assets or services related to operating, investment and financing activities.

21.1.1 Operating commitments given

Operating commitments given by the Group are as follows:

(in millions of euros)	31/12/2023	31/12/2022
Fuel and energy purchase commitments ⁽¹⁾	43,548	43,863
Operating contract performance commitments given	20,103	17,456
Operating lease commitments as lessee	550	671
TOTAL OPERATING COMMITMENTS GIVEN	64,201	61,990

⁽¹⁾Excluding gas purchases and related services

21.1.1.1 Fuel and energy purchase commitments

In the course of its ordinary generation and supply activities, the Group has entered into long-term contracts for purchases of electricity, gas, other energies and commodities and nuclear fuel, for periods of up to 20 years.

The Group has also entered into long-term purchase contracts with a certain number of electricity producers, by contributing to the financing of power plants.

At 31 December 2023, fuel and energy purchase commitments mature as follows:

(in millions of euros)	31/12/2023					31/12/2022
	Maturity					Total
	Total	< 1 year	1 to 5 years	5 to 10 years	> 10 years	
Electricity purchases and related services	29,142	4,396	8,715	6,407	9,624	30,085
Other energy and commodity purchases ⁽¹⁾	390	115	177	98	-	362
Nuclear fuel purchases	14,016	1,755	5,858	4,648	1,755	13,416
FUEL AND ENERGY PURCHASE COMMITMENTS	43,548	6,266	14,750	11,153	11,379	43,863

⁽¹⁾ Excluding gas purchases and related services (see note 21.1.1.1.4).

21.1.1.1 Electricity purchases and related services

Electricity purchase commitments at 31 December 2023 mainly concern EDF Energy and EDF. In the case of EDF many of these commitments are borne by the Island Energy Systems (SEI), which have made commitments to purchase the electricity generated using bagasse and coal.

The change over the year is mainly explained by a decrease in projected electricity prices, partly offset by an increase in the volumes of EDF Energy's purchase obligations resulting from new contracts.

In addition to the obligations reported above and under Article 10 of the Law of 10 February 2000, in mainland France, EDF is obliged, at the producer's request and subject to compliance with certain technical features, to purchase the power produced by co-generation plants and renewable energy generation units (wind turbines, small hydro-electric plants, photovoltaic power, etc.). The additional costs generated by this obligation are offset, after validation by the CRE, by the CSPE. These purchase obligations total 50TWh for 2023 (50TWh for 2022), including 5TWh for co-generation (6TWh for 2022), 23TWh for wind power (22TWh for 2022), 14TWh for photovoltaic power (13TWh for 2022) and 2TWh for hydropower (3TWh for 2022).

21.1.1.2 Other energy and commodity purchases

Purchase commitments for other energies and commodities mainly concern purchases of biomass fuel used by Dalkia in the course of its business.

21.1.1.3 Nuclear fuel purchases

Commitments for purchases of nuclear fuel arise from supply contracts for the nuclear plants intended to cover the EDF group's needs for uranium and fluorination, enrichment and fuel assembly production services.

21.1.1.4 Gas purchases and related services

Gas purchase commitments are principally undertaken by Edison and EDF. The volumes concerned for both entities at 31 December 2023 are as follows:

(in billions of m ³)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
Edison	112	12	46	54	124
EDF	52	2	11	39	56

Gas purchase contracts

Edison has entered into agreements to import natural gas from Libya, Algeria, Azerbaijan and Qatar, for a total maximum volume of 11.9 billion m³ per year. The residual terms of these contracts vary between 4 and 21 years.

In 2020, EDF signed a 5-year purchase contract for 0.5 billion m³ of gas per year from Norway.

In 2017 Edison signed a purchase contract for LNG from the United States (1 million tonnes per year, i.e. 1.4 billion m³ of natural gas, for a 20 - year term). Deliveries under this contract were due to start in 2023. As no deliveries of LNG have been made, Edison began arbitration proceedings against the supplier Venture Global before the London International Court of Arbitration (LCIA) (see note 17.3.5).

In 2014, EDF signed a contract for LNG imports from the United States, for an annual supply of 0.8 million tonnes of LNG (1 billion m³ of natural gas per year) over a 20-year period starting from May 2020. In 2020 EDF also signed a 20-year purchase contract for LNG from the United States (1 million tonnes per year, i.e. 1.4 billion m³ of natural gas). Deliveries under this contract are due to begin in 2026.

Some of these contracts contain "take-or-pay" clauses committing the buyer to pay for a minimum volume of gas every year, whether or not it actually takes delivery of that volume.

Gas-related service contracts

Under the contract with Terminale GNL Adriatico, Edison also benefits from approximately 80% of the terminal's regasification capacities until 2034.

Under the contract with the Dunkerque LNG methane terminal, EDF benefits from approximately 61% of the terminal's regasification capacities until 2037, in return for payment of an annual premium of approximately €150 million. A provision for onerous contracts has been recorded in connection with this contract (voir note 17.2).

21.1.1.2 Operating contract performance commitments given

At 31 December 2023, these commitments mature as follows:

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
Operating guarantees given	11,805	4,064	4,411	3,330	9,648
Operating purchase commitments ⁽¹⁾	8,116	4,674	2,692	750	7,611
Other operating commitments	182	71	94	17	197
OPERATING CONTRACT PERFORMANCE COMMITMENTS GIVEN⁽²⁾	20,103	8,809	7,197	4,097	17,456

⁽¹⁾Excluding fuel and energy

⁽²⁾Including commitments given by controlled entities to joint ventures, amounting to €2.186 million at 31 December 2023 (€1,912 million at 31 December 2022).

In the course of its business, the Group provides contract performance guarantees, generally through the intermediary of banks. Operating guarantees given at 31 December 2023 mainly consist of guarantees given by EDF Renewables in connection with its development projects, Edison and EDF.

The change in these guarantees is essentially explained by new EDF Renewables projects in development (particularly in the United States).

21.1.1.2.1 Operating guarantees given

Operating guarantees given are as follows:

(in millions of euros)	31/12/2023	31/12/2022
EDF Renewables	4,912	3,252
Edison	2,228	2,373
EDF	1,413	1,314
Framatome	977	1,111
EDF Energy	847	622
Other entities	1,428	976
TOTAL	11,805	9,648

21.1.1.2.2 Operating purchase commitments

Operating purchase commitments are as follows:

(in millions of euros)	31/12/2023	31/12/2022
EDF	3,294	3,399
Framatome	1,724	1,493
Enedis	1,029	896
EDF Renewables	673	450
EDF Energy	380	317
Other entities	1,016	1,056
TOTAL	8,116	7,611

21.1.1.2.3 Lease commitments as lessee

At 31 December 2023, lease commitments as lessee break down as follows:

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
LEASE COMMITMENTS AS LESSEE	550	31	250	269	671

The only remaining off-balance sheet lease commitments are:

- Leases that are exempt from recognition in application of IFRS 16. The total amount concerned at 31 December 2023 is €108 million (€83 million at 31 December 2022);
- Leases of assets that have not yet been made available to the Group (principally real estate and LNG tankers under construction). The right-of-use assets and the lease liability will be recognised in the balance sheet when the leased asset is made available. The total amount concerned at 31 December 2023 is €442 million (€588 million at 31 December 2022). The decrease is notably due to Edison taking delivery of an LNG tanker.

21.1.2 Investment commitments given

At 31 December 2023, details of investment commitments are as follows:

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
Commitments related to acquisition of tangible and intangible assets	16,065	11,086	4,570	409	15,867
Commitments related to acquisition of financial assets	1,247	510	685	52	864
Other commitments related to investments	293	256	35	2	169
TOTAL INVESTMENT COMMITMENTS GIVEN⁽¹⁾	17,605	11,852	5,290	463	16,900

⁽¹⁾Including commitments given by controlled entities to joint ventures, amounting to €161 million at 31 December 2023 (€183 million at 31 December 2022).

21.1.2.1 Commitments related to acquisition of tangible and intangible fixed assets

The commitments related to acquisition of tangible and intangible fixed assets are as follows:

(in millions of euros)	31/12/2023	31/12/2022
EDF	4,820	4,041
EDF Energy	4,662	5,179
Enedis	3,089	2,956
EDF Renewables	1,995	2,050
Framatome	572	666
Other entities	927	975
TOTAL	16,065	15,867

Commitments related to acquisition of tangible and intangible fixed assets principally concern EDF SA (including commitments for the *Grand Carénage* refurbishment programme, the 10-year plant inspections, and a small amount for the EPR 2 project), EDF Energy (mainly commitments related to HPC), Enedis and EDF Renewables (notably commitments for projects in the United States).

For the EPR 2 project, until the final investment decision is made, the amounts recorded in off-balance sheet commitments correspond to the unavoidable commitment for EDF, not the total value of the contracts signed.

The rise in commitments given related to acquisition of tangible and intangible fixed assets is mainly explained by an increase in EDF SA's commitments for maintenance of its nuclear fleet, partly offset by a decrease in commitments given by EDF Energy (due to progress on the HPC project).

21.1.2.2 Commitments related to acquisition of financial assets

The increase in commitments related to acquisition of financial assets is principally attributable to EDF SA's commitment to invest in Nordic's logistics warehouses in Sweden and the Norwegian ferry operator Fjord1. These operations relate to management of the dedicated assets held to secure financing of long-term nuclear obligations.

Some commitments related to acquisition of financial assets cannot be estimated. They mainly concern Belgium: Luminus signed an amendment to the shareholder pact on 26 October 2015. It contains a liquidity clause for the investments held by its minority shareholders, which could, in certain conditions under the control of EDF, result in sale of their shares through an IPO, or purchase of their shares by the Group at market value. This liquidity clause is valid at all times from 1 July 2018 to 31 December 2025.

Regarding the investment in EDF Investissements Groupe (EIG), C3 (a fully-owned EDF subsidiary) has a call option to buy the EIG shares held by NBI (Natixis Belgique Investissement, a subsidiary of the Natixis group) at a fixed price, exercisable at any time until May 2026. Meanwhile, NBI has a cash-settled put option to sell EDF all of its EIG shares for a fixed price, exercisable subject to certain conditions between February 2024 and May 2026.

Due to their features, in compliance with IAS 32, NBI's put option and C3's call option are considered as derivatives and their net value is included in the positive or negative fair value of trading derivatives. At 31 December 2023, the fair value of these trading derivatives is limited.

On 4 November 2022, GE and EDF signed a final agreement related to EDF's acquisition of GE Steam Power's nuclear activities (see note 3.1.3).

21.1.2.3 Other commitments related to investments

Other commitments given related to investments at 31 December 2023 mainly comprise guarantees given by EDF Norte Fluminense in connection with its 51% investment in Sinop Energia, and a guarantee given by Dalkia following the sale of its subsidiary Suir.

21.1.3 Financing commitments given

Financing commitments given by the Group at 31 December 2023 comprise the following:

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
Security interests in real property	3,760	1,187	514	2,059	3,616
Guarantees related to borrowings	1,216	24	650	542	1,587
Other financing commitments	1,067	998	51	18	1,142
TOTAL FINANCING COMMITMENTS GIVEN⁽¹⁾	6,043	2,209	1,215	2,619	6,345

⁽¹⁾ Including commitments given by controlled entities to joint ventures, amounting to €2.113 million at 31 December 2023 (€2.609 million at 31 December 2022). These financing commitments to joint ventures mainly concern EDF Renewables and EDF Trading.

Security interests and assets provided as guarantees mainly concern pledges or mortgages of tangible assets and shares representing investments in consolidated subsidiaries which own property, plant and equipment, for EDF Renewables.

The guarantees given for borrowings are essentially guarantees provided by EDF Renewables for its project financing.

The decrease in financing commitments given principally reflects the release of EDF Renewables' financial guarantee in France for the Saint Nazaïre offshore wind farm project.

21.2 Commitments received

The table below shows off-balance sheet commitments received by the Group that have been valued. Other commitments received are described separately in the detailed notes.

(in millions of euros)	Notes	31/12/2023	31/12/2022
Operating commitments received ⁽¹⁾	21.2.1	9,466	8,916
Investment commitments received	21.2.2	206	317
Financing commitments received ⁽²⁾	21.2.3	13	22
TOTAL COMMITMENTS RECEIVED		9,685	9,255

⁽¹⁾ Excluding commitments related to supplies of energy and related services (see note 21.2.1.4).

⁽²⁾ Excluding commitments related to credit lines, which are described in note 18.4.

21.2.1 Operating commitments received

Operating commitments received by the Group at 31 December 2023 comprise the following:

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
Operating lease commitments as lessor	429	110	143	176	509
Operating sale commitments	7,098	1,787	3,357	1,954	6,348
Operating guarantees received	1,895	1,295	196	404	1,998
Other operating commitments received	44	17	22	5	61
OPERATING COMMITMENTS RECEIVED	9,466	3,209	3,718	2,539	8,916

21.2.1.1 Operating lease commitments as lessor

In 2023, the Group benefits from commitments as lessor in operating leases amounting to €429 million. These commitments mainly concern real estate leases.

21.2.1.2 Operating sale commitments

Operating sale commitments received exclude energy deliveries and principally concern firm orders made through contracts recorded on a percentage-of-completion basis at Framatome (construction and engineering contracts) and EDF Renewables (agreements for operation services, maintenance services, and development and sale of structured assets).

21.2.1.3 Operating guarantees received

Operating guarantees received principally concern Framatome, and relate to supply and technical assistance contracts for EDF's nuclear power plants with guarantees received from suppliers, particularly in connection with ARENH deliveries.

21.2.1.4 Electricity supply commitments

In the course of its business, the EDF group has signed long-term contracts to supply electricity as follows:

- long-term contracts with a number of European electricity operators, for a specific plant or a defined group of plants in the French nuclear generation fleet, corresponding to installed power capacity of 3GW;
- in execution of France's "NOME" Law on organisation of the French electricity market, EDF has a commitment to sell some of the energy generated by its existing nuclear power plants to other suppliers, until 31 December 2025. This has concerned a maximum volume of 120TWh each year since enactment of the law of 16 August 2022 (see note 5.1.1).

21.2.2 Investment commitments received

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
INVESTMENT COMMITMENTS RECEIVED	206	30	12	164	317

The decrease in investment/divestment commitments received mainly reflects the sale by Dalkia of its subsidiary Suir.

21.2.3 Financing commitments received

(in millions of euros)	31/12/2023				31/12/2022
	Total	Maturity			Total
		< 1 year	1 to 5 years	> 5 years	
FINANCING COMMITMENTS RECEIVED	13	2	11	-	22

Note 22 Related parties

ACCOUNTING PRINCIPLES AND METHODS

Related parties include the French State, companies in which the State holds majority ownership and certain of their subsidiaries, and companies in which the EDF group exercises joint control or significant influence. They also include members of the Group's management and governance bodies.

Details of transactions with related parties are as follows:

	Associates and joint ventures		Joint operations		French State or State-owned entities ⁽¹⁾		Group Total	
(in millions of euros)	31/12/2023	31/12/2022	31/12/2023	31/12/2022	31/12/2023	31/12/2022	31/12/2023	31/12/2022
Sales	1,112	933	-	-	3,514	2,709	4,626	3,642
Energy purchases	4,218	2,279	2	2	2,893	2,895	7,113	5,176
External purchases	11	13	7	7	126	206	144	226
Financial assets	180	135	-	-	-	-	180	135
Other assets	952	2,195	-	-	672	560	1,624	2,755
Other non-financial liabilities	1,495	441	1	1	754	558	2,250	1,000

⁽¹⁾ Excluding tax and social liabilities and the CSPE receivable.

22.1 Transactions with entities included in the scope of consolidation

Transactions with the principal associates (CTE (the company that owns RTE) and Taishan) are presented in note 12.

Transactions with other associates, joint ventures, and partner entities in joint arrangements with the Group mainly consist of sales and purchases of energy.

22.2 Relations with the French State and State-owned entities

22.2.1 Relations with the French State

Following the compulsory squeeze-out on 8 June 2023 and the purchase of treasury shares, the French State holds 100% of the capital of EDF at 31 December 2023, and is thus entitled in the same way as any majority shareholder to control decisions that require approval by the shareholders.

In accordance with the legislation applicable to all companies having the French State as their majority shareholder, the EDF group is subject to certain inspection procedures, in particular economic and financial inspections by the State, audits by the French Court of Auditors (*Cour des Comptes*) or Parliament, and verifications by the French General Finance Inspectorate (*Inspection générale des finances*).

The public service contract between the French State and EDF was signed on 24 October 2005. This contract is intended to form the framework for public service missions assigned to EDF by the lawmaker for an unlimited period. The Law of 9 August 2004 does not stipulate the duration of the contract.

22.2.2 Relations with Engie

Enedis and GRDF's common service function, defined by Article L. 111 - 71 of the French Energy Code, is not a legal entity in its own right. Enedis and GRDF are bound by an agreement that defines their relations within this common service function, its competences, and the resulting division of costs. The agreement has an unlimited term and can be terminated at any time subject to 18 months' notice: in such a case, the parties undertake to renegotiate the agreement during the notice period. It is updated regularly. In 2019, the Enedis-GRDF governance agreements were entirely reviewed.

Concerning the common service of LPG distribution and supply in the cities of Ajaccio and Bastia in Corsica, following adoption of article 96 of France's Finance Law for 2022, decree 2023-554 of 30 June 2023 introducing a simplified modification of Corsica's multi-year energy programme stipulated that the Corsican LPG networks would cease operations on 31 December 2038 and set out measures for progressive discontinuation of use from 2024.

Another decree, 2023-872 of 12 September 2023, defines the terms on which the State will bear part of the costs associated with conversion of the LPG networks to electricity or renewable energies. The tender procedures for the Ajaccio and Bastia concessions are still in process. The CRE is currently examining the offers made by Engie with a view to awarding the concessions by the summer of 2024.

These developments have no impact for EDF at this stage, but once the concession renewals are finalised EDF will be required to work on some pilot sectors, to determine the schedule for progressive discontinuation of LPG use over the next 15 years. Ultimately, the prospect of ending LPG distribution operations and converting uses to electricity will need investments to reinforce the electricity distribution networks.

22.2.3 Relations with public sector entities

The EDF group's relations with public sector entities mainly concern Orano.

Transactions with Orano concern:

- the front-end of the nuclear fuel cycle (uranium supplies, conversion and enrichment services);
- the back-end of the nuclear fuel cycle (transportation, storage, processing and recycling services for spent fuel).

Front-end of the cycle

Several important agreements were negotiated between EDF and Orano:

- for supplies of natural uranium: Orano Mining contracts;
- for fluorination and enrichment of natural uranium into uranium 235: an Orano Chimie-Enrichissement contract.

Back-end of the cycle

Relations between EDF and Orano Recyclage concerning transportation, processing and recycling of spent fuels are described in note 15.1.1.1.

22.3 Management compensation

The Company's key management and governance personnel are the Chairman and CEO, the members of the COMEX (Executive Committee) throughout 2023 or since their date of appointment if they joined the COMEX during the year, and the Directors. Directors representing the employees receive no remuneration for their services.

The total compensation paid by EDF and controlled companies to the Group's key management and governance personnel amounted to €14.6 million in 2023 (€12.5 million in 2022). This amount covered short-term benefits (basic salaries, performance-related salary, profit share and benefits in kind), special IEG post-employment benefits where relevant, and the corresponding employer contributions, plus any director's fees.

EDF's key management and governance personnel benefit from no special pension system, starting bonus or severance payment entitlement except by contractual negotiation.

Note 23 Subsequent events

On 25 January 2024 EDF acquired the 5% stake in Framatome held by the minority shareholder Assystem for €205 million (see note 14.5).

In early 2024 EDF completed the acquisition of investments in Fjord1 and Nordic Logistic (see note 15.1.2.3).

Note 24 Statutory auditors' fees

The following table sets forth the fees paid for work done by the Statutory Auditors and their network during 2023:

(in thousands of euros)	PWC network		KPMG network		Deloitte network	
	Amount (excluding taxes)	%	Amount (excluding taxes)	%	Amount (excluding taxes)	%
Audit –Statutory audit, certification, review of company and consolidated accounts						
EDF	2,628	15.3	2,523	11.7	-	-
Controlled entities ⁽¹⁾	5,362	31.3	16,920	78.3	1,758	83.7
Sub-total	7,990	46.6	19,443	89.9	1,758	83.7
Non-audit services⁽²⁾						
EDF	1,302	7.6	1,181	5.5	-	-
Controlled entities ⁽¹⁾	7,849	45.8	996	4.6	343	16.3
Sub-total	9,151	53.4	2,176	10.1	343	16.3
TOTAL	17,141	100.0	21,620	100.0	2,101	100.0

⁽¹⁾ Fully consolidated subsidiaries and jointly controlled entities whose auditors' fees are included in the consolidated income statement.

⁽²⁾ These are services required by laws and regulations, and services supplied at the request of the Group, mainly (i) certifications of financial and accounting information or Independent Reports on social, environmental and societal information required under Article L. 225 - 102 - 1 of the French Commercial Code, (ii) services relating to acquisitions or disposals of entities, (iii) tax services authorised by local legislation, and (iv) operating process reviews and information system consulting services that are unrelated to the production of accounting and financial information.

Statutory Auditors' fees for 2022

The following table sets forth the fees paid for work done by the Statutory Auditors and their network during 2022:

(in thousands of euros)	KPMG network		Deloitte network	
	Amount (excluding taxes)	%	Amount (excluding taxes)	%
Audit –Statutory audit, certification, review of company and consolidated accounts				
EDF	2,928	14.2	3,022	26.7
Controlled entities ⁽¹⁾	15,464	75.2	6,531	57.7
Sub-total	18,392	89.4	9,553	84.4
Non-audit services				
EDF	678	3.3	1,480	13.0
Controlled entities ⁽¹⁾	1,508	7.3	292	2.6
Sub-total	2,187	10.6	1,772	15.6
TOTAL	20,579	100	11,325	100

⁽¹⁾ Fully consolidated subsidiaries and jointly controlled entities whose auditors' fees are included in the consolidated income statement.