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INVESTORS SERVICE

CREDIT OPINION
6 June 2023

Update

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RATINGS

Electricite de France

Domicile	Paris, France
Long Term Rating	Baa1
Type	LT Issuer Rating
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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Electricite de France

Update following rating affirmation

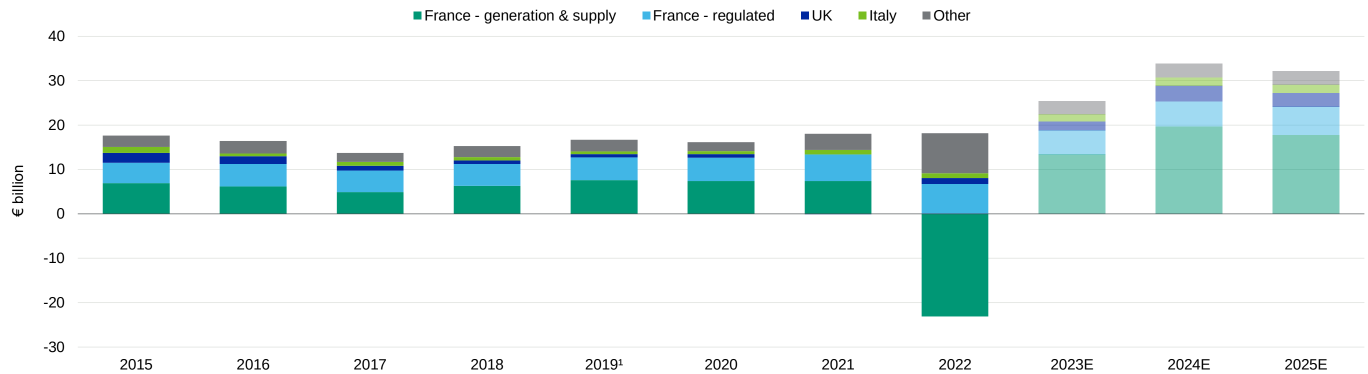
Summary

Electricite de France's (EDF) credit quality is underpinned by the scale and breadth of EDF's businesses across the energy value chain in France, which account for more than 75% of its EBITDA on average over 2017-21, with 2022 not being representative because of the material reported loss; the contribution to earnings from its domestic regulated activities and renewables business, which together account for around one-third of the group's EBITDA, as a result of new connections and additional capacity that are driven by the energy transition plan outlined in the multi-year energy programme; and its geographical diversification, given its sizeable positions in Italy and the UK. These positives are balanced by EDF's fixed-cost merchant power generation in France and the UK, which exposes it to volatile and unpredictable power prices, as illustrated by the large moves since October 2021; a significant capital spending programme in a context of high leverage, which structurally results in negative free cash flow (FCF); and the construction risk associated with the Flamanville new nuclear reactor in France and the Hinkley Point C (HPC) new nuclear project in the UK.

On 1 June 2023, we affirmed EDF's Baa1 issuer and senior unsecured ratings, and concurrently downgraded the Baseline Credit Assessment (BCA) to ba1 from baa3. This rating action reflects a high probability of support from EDF's sole shareholder upon re-nationalisation, the Government of France (Aa2 stable), in a context of the group's slow progress in recovering output; high sensitivity of earnings and financial metrics to potential production shortfalls, given high and volatile wholesale electricity prices and the group's significant debt burden; stalled progress towards new regulation supportive of credit quality; and exposure to an ambitious new nuclear programme.

Exhibit 1

After weak performance of generation and supply businesses in France in 2022, EDF to benefit from current favourable market conditions



2023-25 estimates represent our forward view, not the view of the issuer. Application of IFRS 16 is from 2019.
Sources: Company and Moody's Investors Service

The Baa1 rating incorporates three notches of uplift for potential extraordinary government support, given the company's full ownership by the Government of France. The uplift reflects our assessment of a high dependence on and support from the government.

Credit strengths

» Status as the leading electric utility in France

» Regulated activities and geographical diversification, which support cash flow stability

» Support from the French government, the sole EDF shareholder upon re-nationalisation

Credit challenges

» Earnings sensitivity to the incremental risks associated with the ageing nuclear fleet, resulting in longer outages, higher maintenance costs and an unprecedented short generation/long supply position in 2022

» Significant capital spending programme, which results in persistently negative FCF

» High leverage

» Stalled progress towards new regulation supportive of credit quality after 2025

» High volumes of fixed-cost, low-emission merchant power generation in France and the UK, which exacerbates EDF's exposure to power price volatility

» Construction risk associated with the ongoing Flamanville 3 and HPC nuclear power plant projects in France and the UK, supplemented with the development of six (potentially 14) new European pressurised reactors (EPRs) by 2050

» Regular political interventions with regards to affordability concerns, which could be detrimental to EDF's economic interests

Rating outlook

The stable rating outlook reflects our expectation that EDF’s leverage will stabilise in the next 18-24 months on the back of favourable market conditions, elevated power prices and nuclear output in France gradually recovering towards 350 terawatt hours (TWh).

Factors that could lead to an upgrade

Upward rating pressure is unlikely in the near term, given EDF’s business mix, earnings exposure to volatile power prices and the nuclear fleet’s availability, as well as the commitment to nuclear projects in the long term. Nevertheless, upward rating pressure could develop over time if there were an improved track record in the availability of the existing French nuclear fleet; solid evidence that

EDF can develop new nuclear plants on time and budget, and that the French government would further support the financing of the forthcoming construction; and if EDF managed to deliver at least neutral FCF on a sustainable basis.

Factors that could lead to a downgrade

The ratings could be downgraded if EDF's credit metrics appear likely to fall persistently below guidance for a ba1 BCA, namely funds from operations (FFO)/net debt in the mid to high teens in percentage terms on a sustainable basis; a change in the group's relationship with the French government were to cause us to remove the uplift for government support; or there were to be a significant downgrade of France's government rating.

The ratio guidance for a ba1 BCA might be revised if EDF's risk profile evolves.

Key indicators

Exhibit 2

Electricite de France

	Dec-17	Dec-18	Dec-19	Dec-20	Dec-21	Dec-22	2023 - 2025 (E)
(CFO Pre-W/C + Interest) / Interest Expense	4.8x	5.9x	5.6x	7.0x	7.5x	-4.5x	6x - 10x
(CFO Pre-W/C) / Net Debt	17.7%	21.3%	19.4%	22.4%	20.3%	-18.7%	24% - 28%
RCF / Net Debt	16.8%	19.7%	18.6%	21.6%	19.5%	-19.6%	23% - 27%

All figures and ratios are calculated using our estimates and standard adjustments. The forecasts (f) or projections (E) are our opinion and do not represent the views of the issuer. Periods are financial year end unless indicated.
These ratios do not take into account the fair value of EDF's stake in France's transmission network owner and operator RTE which is included in the company's dedicated assets.
Source: Moody's Investors Service

Profile

With net installed generation capacity of 121.5 gigawatts (GW) as of 31 March 2023, Electricite de France (EDF) is one of Europe's largest integrated utilities, providing electricity generation, distribution and supply services. The group is organised along the following business lines:

» Generation and supply in France, where it is the dominant power generator and supplier

» Regulated supply in France, which primarily includes electricity distribution through its subsidiary, Enedis

» UK, through EDF Energy Holdings Ltd (EDF Energy, Baa3 stable), which is the country's largest generator operating the UK nuclear fleet

» Italy, where it is the third-largest generator through Edison S.p.A. (Edison, Baa3 stable)

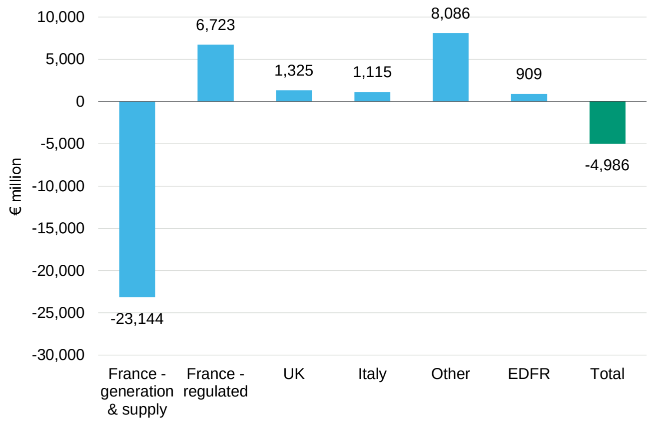
» Other international, which mainly consists of operations in Belgium, where Luminus is the second-largest electricity group

» EDF Renouvelables (EDFR), the group's wholly owned investment vehicle for renewables, excluding hydro

» Other several activities, which include Framatome, EDF Trading Limited (Baa3 stable) and energy services through Dalkia

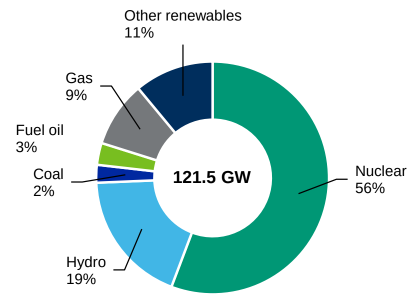
Upon re-nationalisation, which closes in early June 2023, EDF will be fully state-owned and delisted.

Exhibit 3
EBITDA was down significantly in 2022 because of weak performance of generation and supply in France



Sources: Company and Moody's Investors Service

Exhibit 4
EDF's installed capacity includes mostly nuclear and hydro
Net consolidated capacity split by fuel (as of 31 March 2023)



Sources: Company and Moody's Investors Service

Detailed credit considerations

Production shortfall significantly hit EDF's cash generation

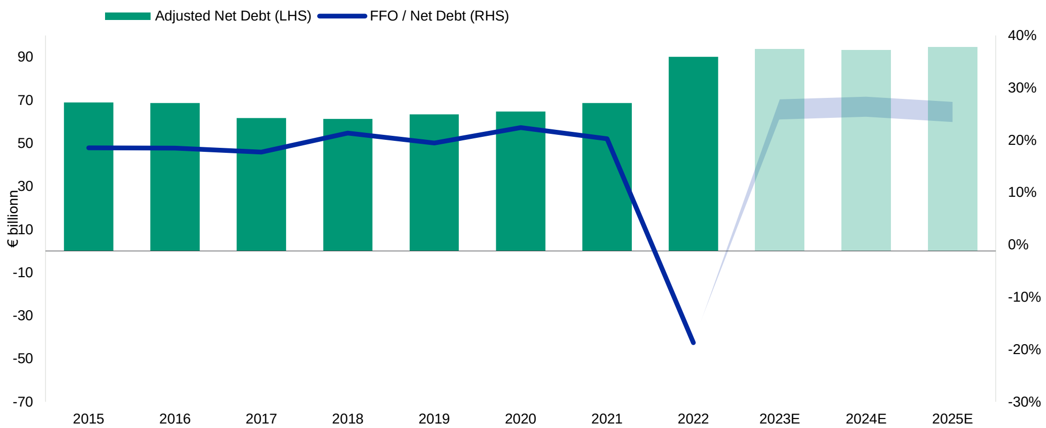
EDF's performance in 2022 was weak, resulting in a €5 billion EBITDA loss, compared with a €18 billion EBITDA in 2021, predominantly because of shortfalls in nuclear production throughout 2022 (See Further cut in anticipated nuclear output is credit negative, published on 20 May 2022) due to corrosion defects in the safety injection system circuit pipes of several nuclear power plants in France, which forced the company to carry out several outages. Other main negative factors included the 20 TWh increase in the ARENH (*Accès régulé à l'électricité nucléaire historique*) cap decided by the government in January 2022 and unfavourable hydro conditions and a context of high power prices because of the gas crisis in Europe and EDF's predominance in the French generation mix.

The ARENH changes and lower-than-budgeted nuclear output resulted in €37.3 billion of costs for EDF. In accordance with its hedging policy, the group had sold forward substantially all of its anticipated 2022 output at a Moody's-estimated price of close to €55 per megawatt hour (MWh). In 2022, it had to buy around 80 TWh of electricity at prevailing market prices to meet its obligations, and sell a total of 20 TWh in 2022 at €46.2/MWh and the rest of the power at a €441/MWh price on average. The planned increase in the ARENH ceiling also weighed on regulated tariffs in 2022 by reducing the contribution of merchant-exposed volumes in the tariff calculation.

In the face of a sharp drop in earnings, EDF had little flexibility to implement mitigation measures. Spending is hard to adjust because this mainly relates to the maintenance and development of nuclear and distribution assets. Tariff hikes are usually constrained by the government's affordability concerns, as illustrated by recent decisions to protect end customers from high power prices over 2022-23. As a result, the plan announced by EDF, designed in early 2022, appeared to underestimate the magnitude of losses that strained the company's financial solidity. It included a €3.1 billion capital increase completed in April 2022, aiming to demonstrate the French government's continuing commitment towards EDF, and a €3 billion disposal programme over 2022-24, which is partially executed (€500 million of proceeds in 2022 related to the disposal of US activities run by EDF Trading). The consequence was a net debt increase of €21.5 billion in 2023 to reach a record high of €64.5 billion, driving EDF's adjusted FFO/net debt to -18.7% in 2022 from 20.9% in 2021.

Exhibit 5

EDF's credit metrics in 2023 are likely to recover after a very weak 2022 because of the ARENH cap increase and reduction in nuclear output



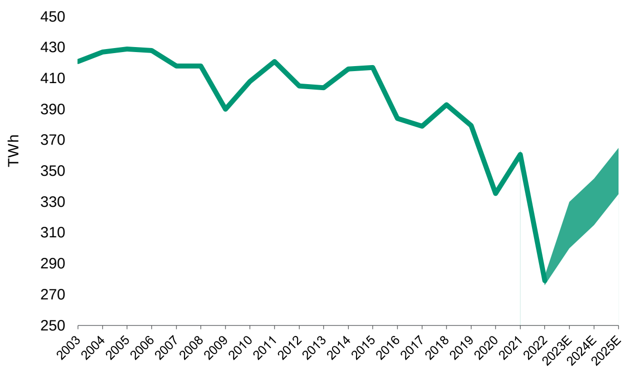
The 2023 and 2024 estimates represent our forward view, not the view of the issuer.

Sources: Moody's Financial Metrics™ and Moody's Investors Service

Over 2023-24, we expect a recovery in EDF's credit metrics, with FFO/net debt ranging between 25% and 28%. EDF will strongly benefit from current elevated prices, even with the continuous reduction in power prices in the French market towards more normalised levels since December 2022. We note that since the beginning of 2023, EDF has twice confirmed its nuclear output target of 300-330 TWh in 2023 and 315-345 TWh in 2024 compared with a record low of 279 TWh in 2022. The expected recovery in nuclear output captures the planned outages, including ongoing progress made on the repair of stress corrosion defaults still affecting six reactors out of a total of 16 detected in late 2021 and early 2022. Confirmations occurred after the detection of material cracks on Penly-1 reactor following stress corrosion repair, which will not require any planned outage extension or new outages.

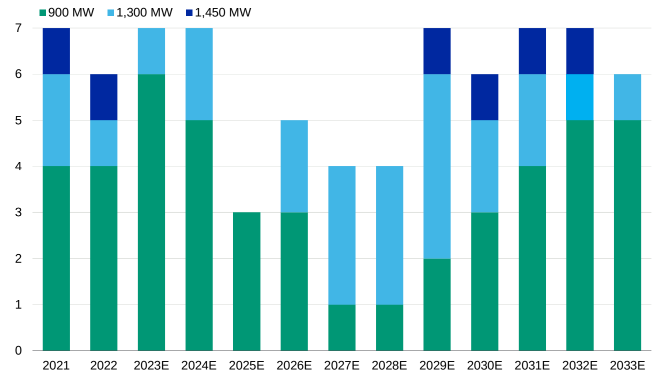
However, financial implications of these unexpected defects in the nuclear fleet showed EDF's earnings vulnerability to potential shortfalls in production, given the prevalence of nuclear in France's generation mix. Given the relatively short history of French nuclear assets and associated difficulties in predicting their availability over time, the likelihood of unexpected new defaults requiring immediate fixes has increased, in particular in a context where EDF's nuclear output has gradually declined over the last 10 years by around 100 TWh, or one-quarter of the early 2010 levels, as Exhibit 6 illustrates, although the fleet scale has remained broadly unchanged at 61.4 GW as of December 2022, excluding the Fessenheim nuclear plant's shutdown completed in 2020 (1.8 GW). This decline in output has resulted from gradually longer planned outages, including for 10-year inspections, weather constraints during drought periods and heatwaves, staff protection measures during the coronavirus pandemic, regular strikes and detection of new defects.

Exhibit 6
Net output of pressurised water reactor fleet in France in TWh



Sources: Company and Moody's Investors Service

Exhibit 7
Current high levels of maintenance will weigh on the output
Number of 10-year inspections by reactor type as of 31 December 2022

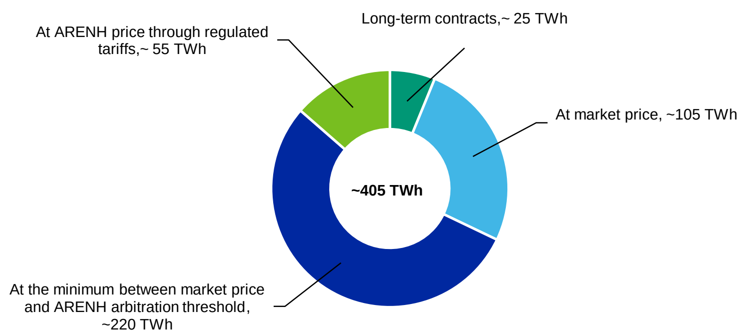


Source: Company

Fixed-cost generation fleet exposed to volatile power prices

We estimate that commodity-exposed activities account for 35%-40% of EDF's EBITDA on average. Around 105 TWh of EDF's domestic electricity sales were directly exposed to market prices in 2022 (see Exhibit 8), which is 15 TWh lower than in 2021. In addition, power generation in the UK and Italy is fully exposed to wholesale prices. Although EDF typically hedges by selling forward a substantial proportion of its outright power generation two to three years ahead of delivery, the company retains exposure to market prices as hedges roll off. Capacity payments mitigate only a part of EDF's commodity price exposure.

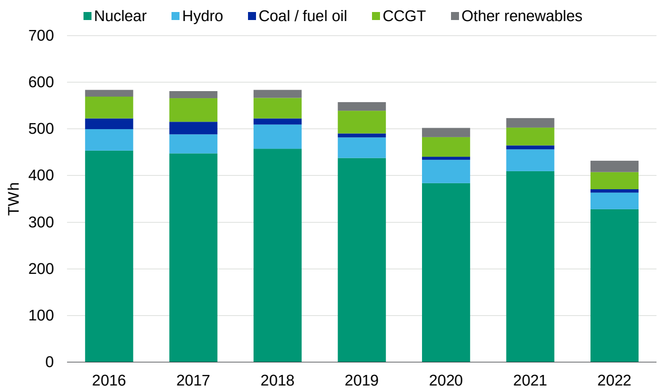
Exhibit 8
Distribution of electricity sales[1] in France according to their market exposure in 2022
In TWh



[1] Sales excluding purchase obligation volumes and volumes under long-term supply contracts.
Sources: Company and Moody's Investors Service

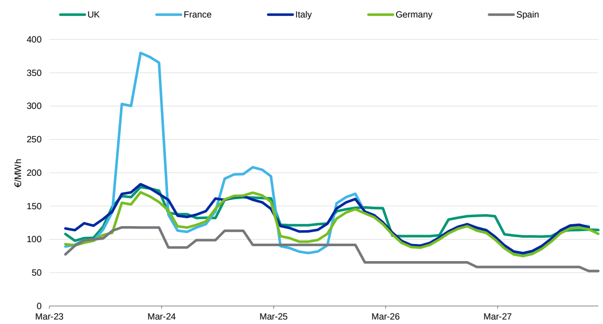
EDF is particularly exposed to movements in wholesale power prices because its generation fleet is predominantly fixed-cost. In 2022, 90% of its 431.7 TWh output was generated by nuclear and renewable assets. Given the group's strategy is focused on new nuclear and renewable capacity, aligned with the French national energy policy, we expect this percentage to further grow over time.

Exhibit 9
Most of EDF's generation output ...
Output by technology



Sources: Company and Moody's Investors Service

Exhibit 10
... is exposed to volatile power prices
One-year forward baseload power price as of 24 May 2023



Sources: FactSet

Like other large European markets, including the UK, forward baseload power prices in France have been extremely volatile since October 2021, as shown in Exhibit 10. The low visibility on nuclear output has further exacerbated the volatility and pressure on power prices in France in comparison with the closest European electricity markets. Uncertainty still drives higher prices in France compared with the European average around the 2023 and 2024 winter seasons where the demand-supply balance is more fragile in France, given the elevated consumption over winter periods.

At the end of May 2023, the one-year forward price was around €200/MWh, down 54% from the Q4 2022 average, driven by the decrease in gas prices and expectation that the consumption will not deviate from historical averages.

Forward wholesale power prices for 2024 and 2025 have averaged €193/MWh and €145/MWh, respectively, since the start of the year. Higher prices, if sustained, will benefit EDF's largely fixed-cost generation, without any unexpected production shortfalls, but are subject to historical hedges and the direct and indirect effects of the ARENH mechanism.

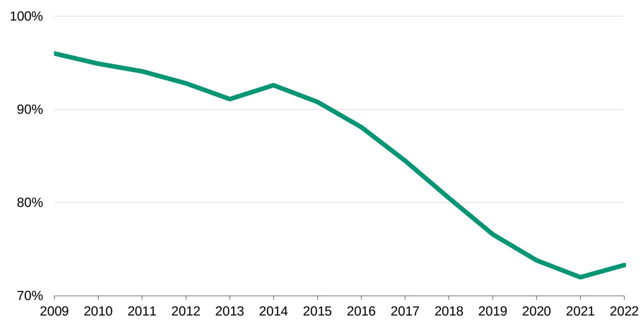
Leading electric utility in France, in a difficult operating environment

EDF is the leading electricity generator in France, with 86.5 GW of installed capacity as of the end of December 2022. The company's annual domestic generation (on average 400 TWh-420 TWh, excluding French island activities, which represents 70%-72% of the national power output and mostly generated by nuclear and hydropower plants) historically matched its downstream position, which accounted for 57% of the electricity consumption in France as of December 2022.

This balanced market position, combined with the predominantly regulated nature of electricity tariffs until 2015, historically underpinned the predictability of EDF's cash flow. However, growing competition in the supply market resulted in higher churn rates (see Exhibits 11, 12) leaving EDF being long generation. However, this trend has been reversing from 2022 when rising procurement costs for alternative suppliers encouraged consumers to return to EDF's regulated tariffs. At the end of October 2022, the company reported a net gain of 946,000 customers that applied for regulated tariffs in 2022. As a result, EDF's downstream position exceeded its power output because of the limited nuclear generation in 2022, increasing unhedged procurement costs.

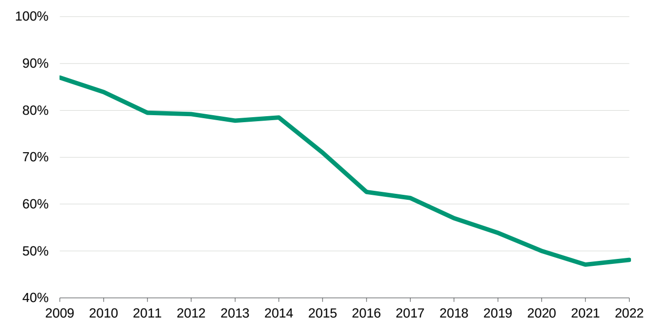
In the near term, we expect EDF to restore the upstream/downstream balance on its domestic market, supported by the recovery in nuclear output and additional renewable capacity.

Exhibit 11
EDF was gradually losing market share in both the residential ...
Incumbent share of the residential electricity supply market in France



Source: CRE

Exhibit 12
... and nonresidential power supply markets in France, but the trend has been reversing since Q2 2022
Incumbent share of the nonresidential electricity supply market in France



Source: CRE

Regulated activities and geographical diversification help cash flow stability

EDF's credit profile is supported by its regulated activities in France, which accounted for 12.6% of the group's revenue in 2022. These activities include, in addition to domestic electricity distribution through its subsidiary Enedis, regulated generation, and network and supply businesses in the French islands. These activities exclude EDF's 50.1% interest in France's transmission network owner and operator RTE, which is equity-accounted.

Enedis' revenue benefits from a high degree of visibility under a regulatory framework that entered its sixth four-year regulatory period in August 2021 (TURPE 6). Under this framework, Enedis earns a return on regulated equity of 2.3% (nominal, pretax) and a 2.5% margin on its €53.7 billion regulated asset base. Although the return on capital depends little on interest rate trends and is stable at 2.5% since TURPE 4, the return on regulated equity decreased to 2.3% from 4% under the TURPE 6 regulatory framework to take into account the reduction in the risk-free rate and the corporate tax rate in France.

Exhibit 13
Regulatory framework TURPE 6
A remuneration mechanism based on a guaranteed return

Parameter	Turpe 6 (August 2021-July 2025)
Method	Margin on RAB, return on regulatory equity and allowance for cost of debt, revenue cap with incentives
Length of the regulatory period	4 Years
RAB calculation	Net accounting value of in-use assets
Allowed returns	2.5% margin on RAB, 2.3% return on regulatory equity
Incentive regulation	Targets raised, notably quality of service
Annual tariff indexation	Annual tariff indexation includes 0.31% remuneration above inflation.

Sources: EDF and CRE

In 2022, EDF's activities outside France partially offset the underperformance of generation and supply in France. In the UK, operational performance benefited from a higher nuclear output, leading to a €1.3 billion EBITDA in a high-price environment, compared to a €21 million EBITDA loss posted in 2021 (see EDF Energy's credit opinion). Edison in Italy again reported a strong performance resulting from high market prices and good availability of CCGTs (see Edison's credit opinion). EDFT posted a record profit, with EBITDA of €6.4 billion, in a context of high volatility across all commodity markets (see EDF Trading's credit opinion).

Significant capital spending programme leads to execution risk and negative FCF

EDF faces a substantial capital investment programme over the coming years, which we estimate at €20 billion-€25 billion annually through 2025, with significant and largely non-discretionary spending required to maintain and upgrade its distribution network and nuclear fleet in France. The sole 10-year inspection programme is estimated at €33 billion over 2022-28, reflecting the age of the fleet, which is more than 33 years on average, and EDF's strategy to extend its life span to 50 years (or more); the group's ongoing programme to reduce unplanned outages; and more stringent nuclear safety requirements after the Fukushima incident. This estimate excludes the costs associated with the repair work in 2023-24 resulting from the corrosion defects.

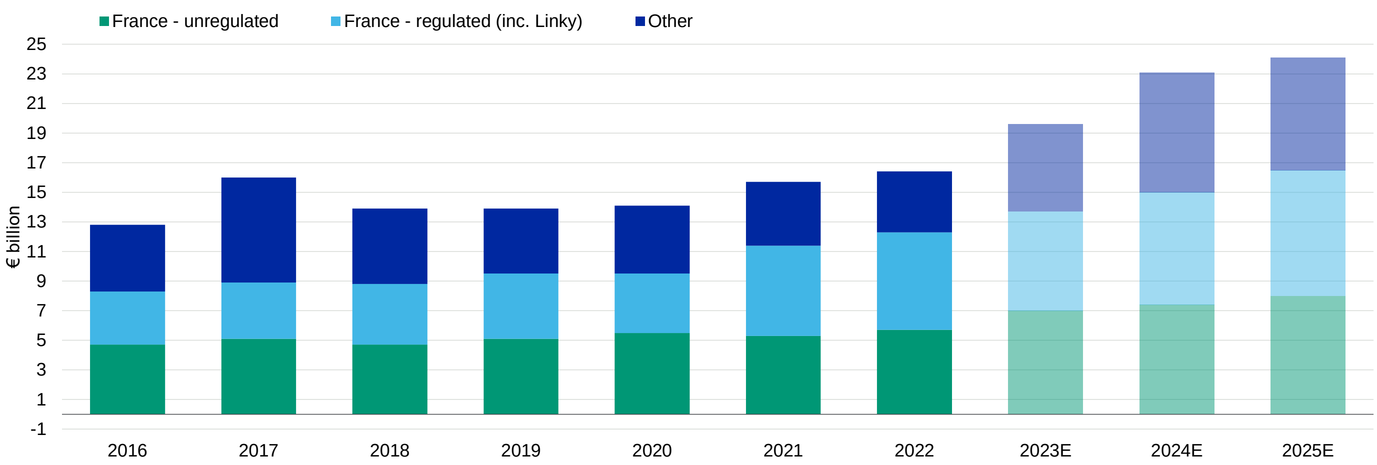
Other significant projects (excluding new nuclear reactor construction, discussed below) include the accelerated expansion of renewable capacity through EDFR unveiled in February 2021, comprising the upgraded objective of doubling the renewable installed capacity to 60 GW net by 2030 from around 34.1 GW in 2020 (including hydro), compared with the 50 GW initially stated. The new strategic roadmap, which is to be presented by the end of June or in July 2023, might adjust the current objective. However, we believe that EDF will remain heavily involved in the deployment of new renewable assets.

Since Q4 2019, and at the request of the French government, EDF has been assessing the feasibility of constructing new EPRs in the country by 2040. The government confirmed in February 2022, ahead of the Flamanville nuclear power plant's commissioning, the plan to build six (potentially 14) new EPRs by 2050, starting in 2027. The first commissioning will likely take place in 2035-37. EDF estimates construction costs for the first six units to be €51.7 billion, excluding financing costs, supplemented with potentially €4.6 billion for schedule overruns. In addition, the closing of 14 nuclear reactors at their 40th anniversary is no longer being considered and the plan is to extend their life span for as long as possible.

As a result, the government will amend the current *Programmation pluriannuelle de l'energie* (PPE), published in February 2019, which will, however, continue setting out the government's aim to continue France's planned transformation into a carbon-neutral economy. The new plan is likely to increase targets with regard to offshore wind and solar capacity, alongside the larger nuclear fleet.

Implications for EDF's credit profile will depend on the arrangements, including the support from the French government, with regard to, among other things, exposure to nuclear construction risk, tariff regime, financing structure and financial costs, given the company's constrained financial flexibility.

Exhibit 14
EDF's capital spending is likely to remain high
Net investments, excluding the asset disposal programme



The 2023-25 estimates represent our forward view, not the view of the issuer.
Sources: Company and Moody's Investors Service

Ongoing new nuclear projects increase construction risk and cost

In France, EDF began the construction of the 1.6 GW Flamanville 3 nuclear plant in 2007, with commercial operations scheduled for 2012 and an estimated total cost of €3.3 billion. However, there have been a series of cost overruns and delays in the life of this first EPR project in France.

In December 2022, EDF announced a new six-month schedule overrun in Flamanville 3's construction, resulting in €500 million of extra costs. Fuel loading is now expected to take place in Q1 2024. The estimated cost at completion is €13.2 billion (in 2015 prices) and excluding interim interest. This schedule update was mainly due to supplementary studies that were needed to establish a new process for the stress-relieving heat treatment of some welds that have been upgraded in the last two years, which are located close to sensitive equipment for the nuclear plant functioning. EDF expects that Flamanville 3 will be fully operational in 2026. This is because the first reactor visit will take place presumably in 2025 (still subject to the Autorité de Sûreté Nucléaire (ASN)'s approval), with the purpose of fixing issues related to poured concrete, which will drive the change of the vessel head, resulting in a six-month outage. From 2026, the power plant is likely to generate around 11 TWh annually.

EDF also began construction of the 3.2 GW Hinkley Point C plant (HPC, United Kingdom) in early 2017. HPC will only be the fifth plant in the world that will use the EPR technology. The total construction cost of the HPC project, of which 66.5% has been funded by EDF and the remaining 33.5% so far by its partner China General Nuclear Power Corporation (CGN, A2 stable), was revised upwards for the third time in May 2022 to £25 billion-£26 billion (in 2015 prices) from a previous estimate of £21.5 billion-£22.5 billion in September 2019 (see Electricite de France: New cost overrun and potential delay at Hinkley Point are credit negative, published on 26 September 2019); the initial construction cost estimate was £18.1 billion. Cost increases reflect difficult ground conditions, extra costs to implement the completed functional design, and a slowdown in work because of the pandemic and staff protection measures. HPC's commissioning is likely to occur in June 2027. However, EDF believes that the risk of a new 15-month schedule overrun is very high.

The increasing cost estimates illustrate the execution risks that EDF and CGN face in constructing the power station. In addition, EDF's balance sheet will have to suffer the financial implications of a very long construction phase, given that the cost will have to be debt-funded because the group has entered into a fixed-price contract-for-differences agreement with the UK government and has no ability to recover the higher costs from customers; and the investment will not generate any cash flow until the power plant is operational.

Need for further support recognised by the French government

Given the full ownership by the French government upon re-nationalisation, we consider EDF a government-related issuer under our methodology. Accordingly, and based on our expectation of support in case of financial distress, the Baa1 rating factors in three notches of uplift from the group's BCA of ba1.

Our government support expectation reflects the strategic importance of EDF to the French government as the owner and operator of France's nuclear power plants; the company's highly unionised and politically influential workforce, as reflected in the numerous strikes conducted in 2023 against the national pension reform; and the French government's track record of supporting strategically important entities, illustrated by the subscription to €3 billion of EDF's capital increase in March 2017 and €3.15 billion in April 2022, and the government's decision to convert the Oceane bonds into shares.

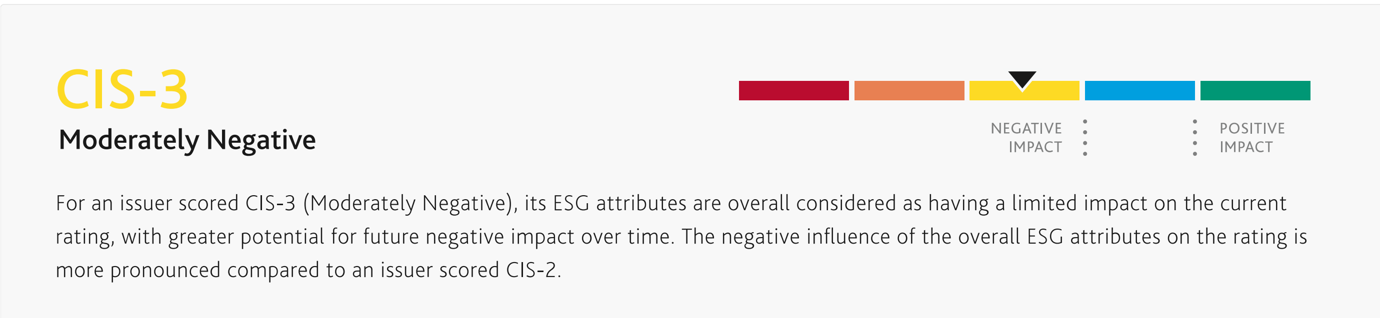
Because of the political endorsement of EDF's capital spending programme (notably with respect to HPC, Linky smart meters, and the development of renewable and nuclear capacities) and its scale compared with its cash flow generation capacity, we expect the French government to continue to provide financial relief, with the re-nationalisation confirming EDF's importance to France.

Changes to the asymmetric ARENH mechanism aim to transform the electricity sector in a cost-efficient manner while giving EDF financial capacity for necessary investments. The ARENH mechanism, whose formal expiry date is year-end 2025, has appeared to be detrimental to the group's earnings because its optionality procures 100 TWh at €42/MWh to alternative suppliers when prices are elevated, and prevents EDF from protecting its cash generation when prices are low. In January 2020, the French government initiated a consultation about the new nuclear regulation (see Electricite de France: Proposed new regulatory framework for nuclear power may increase earnings visibility, published on 30 January 2020). Since this consultation, the government has been conducting extensive discussions with the European Commission, which were suspended because of the French general elections. Negotiations have recently resumed in a context of parallel discussions around the European electric market design to address the energy crisis, with France being committed to align with the current proposals, encouraging long-term power purchase agreements for the existing nuclear output, which will rule out the previously contemplated nuclear regulation. If the European Commission approves such a scheme, EDF will benefit in the near term from the current levels of power prices, which significantly exceed nuclear production costs. However, the relatively high volatility of power prices over time could have negative implications if market conditions were to become unfavourable, given the group's generation mix remaining predominantly merchant.

ESG considerations

Electricite de France's ESG Credit Impact Score is Moderately Negative CIS-3

Exhibit 15
ESG Credit Impact Score



Source: Moody's Investors Service

EDF's ESG Credit Impact Score is moderately negative (**CIS-3**), indicating that its ESG attributes are overall considered as having a limited credit impact, with greater potential for a future negative impact over time. This reflects highly negative social risks, following measures endorsed by the government to protect end-customers at the detriment of EDF's economic interests and lack of visibility around the form and timing of nuclear reform in France, whereas negotiations with the European Commission are suspended. EDF **CIS-3** also captures a moderately negative exposure to environmental and governance risks.

Exhibit 16
ESG Issuer Profile Scores

Source: Moody's Investors Service

Environmental

EDF's exposure to environmental risks is moderately negative (**E-3** issuer profile score) driven by moderate exposure to physical climate risks associated with the group's French electricity distribution assets (which contributes to 32% of EBITDA in 2020) and to Waste and Pollution risks given the material costs associated with nuclear decommissioning and nuclear waste treatment, albeit largely covered by a sizeable dedicated asset portfolio. It also captures the exposure of the group's nuclear fleet (c. 56% of the total installed capacities as of March 2023) to moderate risks of water management, in the event of restricted access to water induced by regular heat waves over summers. The profile also incorporates a large investment programme to increase the share of power output from renewables (excluding hydro).

Social

Highly negative social risks for EDF (**S-4** issuer profile score) reflects the fundamental utility risk that demographics and societal trends could include public concerns over affordability, public expectation that utilities act as public service, utility's reputational risk. These pressures could turn into adverse political intervention, as evidenced by the decision of French government to protect end-customers at the detriment of EDF financial flexibility in an electoral context, which resulted in a €-8.2bn impact on 2022 EBITDA. This also includes nuclear exposures and associated risk to public health.

Governance

EDF's governance risks are moderately negative (**G-3** issuer profile). This assessment takes into account neutral to low scores on financial strategy and risk management, management credibility and track record, organizational structure, compliance and reporting, which counterbalance the moderate risk associated with board structure policies and procedures, resulting from having only one shareholder(French State). EDF's board has implemented measures to bolster its balance sheet including capital increases of €4 billion in 2016 and €3.15 billion in 2022 and scrip dividend over the last six years. At the same time, the company has also acted to support other parts of the nuclear industry to the detriment of its credit quality.

ESG Issuer Profile Scores and Credit Impact Scores for the rated entity/transaction are available on Moodys.com. In order to view the latest scores, please click here to go to the landing page for the entity/transaction on MDC and view the ESG Scores section.

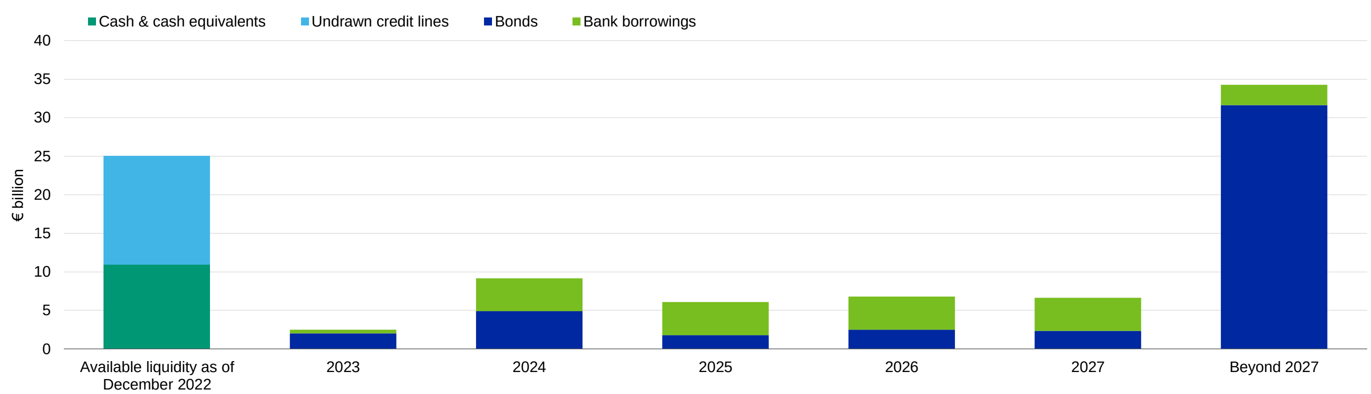
Liquidity analysis

EDF's liquidity is underpinned by large holdings of cash and cash equivalents, and committed bank facilities. As of 31 December 2022, the group had €29.4 billion of cash and cash equivalents and liquid financial assets. In addition, unused committed credit facilities amounted to €14 billion, of which €2.6 billion mature within one year. These sources are sufficient to cover the group's €4 billion of debt maturities and negative FCF over the next 18 months.

Exhibit 17

EDF has a well-spread debt maturity profile

Debt maturity profile and available liquidity as of 31 December 2022



Sources: EDF and Moody's Investors Service

Methodology and scorecard

EDF is rated in accordance with the rating methodologies for Unregulated Utilities and Unregulated Power Companies, published in May 2017, and Government-Related Issuers Methodology, published in February 2020.

Exhibit 18

Rating factors

Electricite de France

Unregulated Utilities and Unregulated Power Companies Industry Grid [1]	FY ending 31, December 2022		Moody's 12-18 Month Forward View [2][3]	
Factor 1 : Scale (10%)	**Measure**	**Score**	**Measure**	**Score**
a) Scale (USD Billion)	Aaa	Aaa	Aaa	Aaa
Factor 2 : Business Profile (40%)				
a) Market Diversification	A	A	A	A
b) Hedging and Integration Impact on Cash Flow Predictability	Baa	Baa	Baa	Baa
c) Market Framework & Positioning	Baa	Baa	Baa	Baa
d) Capital Requirements and Operational Performance	B	B	B	B
e) Business Mix Impact on Cash Flow Predictability	Aa	Aa	Aa	Aa
Factor 3 : Financial Policy (10%)				
a) Financial Policy	Baa	Baa	Baa	Baa
Factor 4 : Leverage and Coverage (40%)				
a) (CFO Pre-W/C + Interest) / Interest (3 Year Avg)	2.5x	B	6x - 10x	Baa - A
b) (CFO Pre-W/C) / Net Debt (3 Year Avg)	5.2%	B	24% - 28%	Baa
c) RCF / Net Debt (3 Year Avg)	4.3%	B	23% - 27%	Baa - A
Rating:				
a) Scorecard indicated outcome		Baa3		A3
b) Actual Baseline Credit Assessment				ba1
Government-Related Issuer				**Factor**
a) Baseline Credit Assessment				ba1
b) Government Local Currency Rating				Aa2
c) Default Dependence				High
d) Support				High
e) Final Rating Outcome				Baa1

[1] All ratios are based on adjusted financial data and incorporate our Global Standard Adjustments for Non-Financial Corporations.
[2] As of May 2023.
[3] This represents our forward view, not the view of the issuer, and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Sources: Moody's Investors Service and Moody's Financial Metrics™

Ratings

Exhibit 19

Category	Moody's Rating
ELECTRICITE DE FRANCE	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1
Jr Subordinate	Ba2
Commercial Paper	P-2
EDF TRADING LIMITED	
Outlook	Stable
Issuer Rating	Baa3
EDISON S.P.A.	
Outlook	Stable
Issuer Rating	Baa3
EDF ENERGY HOLDINGS LTD	
Outlook	Stable
Issuer Rating -Dom Curr	Baa3

Source: Moody's Investors Service

Appendix

Exhibit 20

Peer comparison

Electricite de France

	Electricite de France Baa1 Stable			ENGIE SA Baa1 Stable			RWE AG Baa2 Stable			E.ON SE Baa2 Stable			ENEL S.p.A. Baa1 Negative		
(in EUR million)	FYE Dec-20	FYE Dec-21	FYE Dec-22	FYE Dec-20	FYE Dec-21	FYE Dec-22	FYE Dec-20	FYE Dec-21	FYE Dec-22	FYE Dec-20	FYE Dec-21	FYE Dec-22	FYE Dec-20	FYE Dec-21	FYE Dec-22
Revenue	69,031	84,461	143,476	44,306	57,866	93,865	13,688	24,571	38,366	60,944	77,358	115,660	63,642	81,900	135,653
EBITDA	13,711	16,261	(4,246)	8,515	10,981	8,549	4,605	3,453	5,501	6,703	8,601	8,603	15,388	15,432	17,218
Total Assets	302,380	358,713	390,139	154,336	227,537	237,719	61,578	142,226	138,502	95,385	119,759	134,009	163,453	206,940	219,618
Total Debt	85,746	91,145	119,004	54,587	56,509	57,623	14,529	21,239	25,392	50,931	48,644	44,689	61,807	76,680	93,887
Net Debt	64,690	68,687	90,115	41,675	42,791	42,065	5,536	7,374	4,936	45,265	41,715	34,769	55,901	67,822	82,846
FFO / Net Debt	22.4%	20.3%	-18.7%	17.6%	20.4%	23.2%	68.4%	35.2%	133.3%	9.9%	15.6%	18.7%	21.4%	15.8%	13.4%
RCF / Net Debt	21.6%	19.5%	-19.6%	16.3%	16.1%	16.9%	58.6%	25.1%	114.5%	6.5%	11.9%	14.2%	12.7%	8.2%	7.3%
(FFO + Interest Expense) / Interest Expense	7.0x	7.5x	-4.5x	6.5x	8.1x	6.3x	6.7x	5.0x	6.6x	3.6x	4.5x	4.1x	6.2x	5.3x	5.0x
Debt / Book Capitalization	62.2%	61.2%	74.0%	60.1%	54.2%	56.8%	42.4%	52.6%	44.8%	78.8%	69.8%	64.4%	55.2%	60.8%	65.5%

All figures and ratios are calculated using our estimates and standard adjustments. FYE = Financial year end. LTM = Last 12 months.
Source: Moody's Financial Metrics™

Exhibit 21

Adjusted debt breakdown

Electricite de France

(in EUR million)	FYE Dec-17	FYE Dec-18	FYE Dec-19	FYE Dec-20	FYE Dec-21	FYE Dec-22
As Reported Total Debt	56,846	59,188	67,380	65,591	69,406	96,053
Pensions	14,063	11,687	13,440	14,270	14,059	11,102
Leases	4,488	4,368	0	0	0	0
Hybrid Securities	5,048	5,051	4,605	5,645	6,132	5,861
Securitization	903	1,095	1,042	792	1,456	2,470
Non-Standard Adjustments	2,731	3,500	(400)	(552)	92	3,518
Moody's Adjusted Total Debt	84,079	84,889	86,067	85,746	91,145	119,004

Source: Moody's Financial Metrics™

Exhibit 22
Adjusted EBITDA breakdown
Electricite de France

(in EUR million)	FYE Dec-17	FYE Dec-18	FYE Dec-19	FYE Dec-20	FYE Dec-21	FYE Dec-22
As Reported EBITDA	16,773	14,915	21,896	18,216	21,242	(7,265)
Unusual Items - Income Statement	(1,519)	186	(2,150)	(1,253)	(2,683)	3,272
Pensions	(403)	(476)	(321)	(232)	(225)	(548)
Leases	748	728	0	0	0	0
Securitization	36	41	34	17	25	106
Interest Expense - Discounting	(2,075)	(2,589)	(2,230)	(3,096)	(2,172)	0
Non-Standard Adjustments	151	242	93	59	73	189
Moody's Adjusted EBITDA	13,712	13,047	17,322	13,711	16,261	(4,246)

Reported EBITDA includes other income and expenses. All figures are calculated using our estimates and standard adjustments.
Source: Moody's Financial Metrics™

Exhibit 23

Select historical Moody's-adjusted financial data

Electricite de France

(in EUR million)	FYE Dec-17	FYE Dec-18	FYE Dec-19	FYE Dec-20	FYE Dec-21	FYE Dec-22
INCOME STATEMENT						
Revenue	64,892	68,546	71,347	69,031	84,461	143,476
EBITDA	13,712	13,047	17,322	13,711	16,261	(4,246)
EBIT	4,573	3,725	7,302	2,757	5,531	(15,325)
Interest Expense	2,917	2,661	2,655	2,392	2,134	3,080
Net income	1,909	373	3,392	(350)	3,007	(14,931)
BALANCE SHEET						
Net Property Plant and Equipment	141,941	145,972	153,632	159,231	166,689	171,445
Total Assets	275,542	286,158	300,199	302,380	358,713	390,139
Total Debt	84,079	84,889	86,067	85,746	91,145	119,004
Cash & Cash Equivalents	22,357	23,593	22,621	21,056	22,458	28,889
Net Debt	61,722	61,296	63,446	64,690	68,687	90,115
Total Liabilities	240,183	248,043	260,137	262,786	315,036	362,003
CASH FLOW						
Funds from Operations (FFO)	10,943	13,085	12,314	14,461	13,911	(16,858)
Cash Flow From Operations (CFO)	12,391	13,428	13,806	12,960	11,736	(8,669)
Dividends	575	986	508	518	521	782
Retained Cash Flow (RCF)	10,368	12,099	11,806	13,943	13,390	(17,640)
Capital Expenditures	(14,856)	(16,217)	(16,189)	(15,473)	(17,658)	(18,332)
Free Cash Flow (FCF)	(3,040)	(3,775)	(2,891)	(3,031)	(6,443)	(27,783)
INTEREST COVERAGE						
(FFO + Interest Expense) / Interest Expense	4.8x	5.9x	5.6x	7.0x	7.5x	-4.5x
LEVERAGE						
FFO / Debt	13.0%	15.4%	14.3%	16.9%	15.3%	-14.2%
RCF / Debt	12.3%	14.3%	13.7%	16.3%	14.7%	-14.8%
Debt / EBITDA	6.1x	6.5x	5.0x	6.3x	5.6x	-28.0x
Net Debt / EBITDA	4.5x	4.9x	3.8x	4.9x	4.4x	-18.0x

Source: Moody's Investors Service

Moody's related publications

Press Releases:

- Moody's affirms EDF's issuer rating; downgrades EDF's BCA to ba1 from baa3; changes the outlook to stable, published on 1 June 2023
- Moody's downgrades EDF's issuer rating to Baa1; negative outlook, published on 21 February 2022
- Moody's reviews EDF's A3 ratings for downgrade, published on 17 January 2022
- Moody's changes outlook on EDF, EDFT, Edison and EDF Energy to stable; affirms ratings, published on 27 August 2021
- Moody's assigns Baa3 rating to EDF's social hybrid notes; negative outlook, published on 26 May 2021
- Moody's upgrades Edison to Baa2; negative outlook, published on 19 April 2021
- Moody's assigns Baa2 long-term issuer rating to EDF Energy Holdings Ltd, negative outlook, published on 9 March 2021
- Moody's assigns Baa3 rating to EDF's hybrid notes; negative outlook, published on September 2020
- Moody's changes outlook on EDF to negative, affirms ratings, published on 24 April 2020

Issuer Comments:

- Electricite de France: Renationalisation would be credit positive, subject to the scale of additional financial support, published on 7 July 2022
- Electricite de France: Further cut in anticipated nuclear output is credit negative, published on 20 May 2022
- Edison S.p.A.: Recent portfolio rotation announcements are credit positive, published on 15 January 2021
- Proposed new regulatory framework for nuclear power may increase earnings visibility, published on 30 January 2020
- Electricite de France: New cost overrun and potential delay at Hinkley Point are credit negative, published on 26 September 2019
- E&P sale accelerates strategic shift toward renewables, published on 5 July 2019
- Edison S.p.A.: Acquisition of EDF EN Italia renewable assets: a modest credit positive, published on 26 June 2019

Credit Opinions:

- Edison S.p.A.: Update to credit analysis, published on 23 May 2023
- EDF Energy Holdings Ltd: Update to credit analysis, published on 4 April 2023
- EDF Trading Limited: Update to credit analysis, published on 5 April 2023

Sector Comments:

- Unregulated Electric and Gas Utilities – Europe: EU electricity market reform proposal credit positive for European unregulated utilities, published on 16 March 2023
- Regulated Electric & Gas Networks – Europe: 2023 outlook stable, as higher inflation and interest rates credit neutral for sector, published on 16 January 2023
- Regulated Electric & Gas Networks – Europe: 2022 outlook stable, with limited changes to key regulatory parameters, published on 10 January 2022

» Regulated Electric & Gas Networks - Great Britain: CMA draft ruling provides only modestconcessions to tough RIIO-2 determination, published on 31 August 2021

» Unregulated Utilities and Power Companies - UK: Re-approval of the UK capacity market is credit positive for generators, published on 24 October 2019

Sector In-Depth:

» Europe's electricity markets: In Europe, tight supply will keep power prices high andprompt further government intervention, 16 November 2022

» Europe's electricity markets: In Europe, high energy prices will not derail the energy transition, 30 November 2021

» Regulated Electric and Gas Utilities – Global: ESG considerations have an overall credit negative impact on utilities with generation, 1 June 2021

» Energy Transition – Europe: Expansion of O&G in utilities' space credit positive for former, negative for latter, 12 November 2020

» Electric Utilities – Global: Cybersecurity readiness depends on scale, business model and generation ownership, 4 November 2020

» In France, concerns around nuclear availability highlight need to make renewables transition, published on 14 October 2020

» In Italy, progress toward decarbonisation is accelerating, 14 October 2020

Industry Outlook:

» Unregulated Electric & Gas Utilities – Europe: 2023 Outlook - Negative on heightened risks from ongoing energy crisis, 28 November 2022

To access any of these reports, click on the entry above. Note that these references are current as of the date of publication of this report and that more recent reports may be available. All research may not be available to all clients.

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