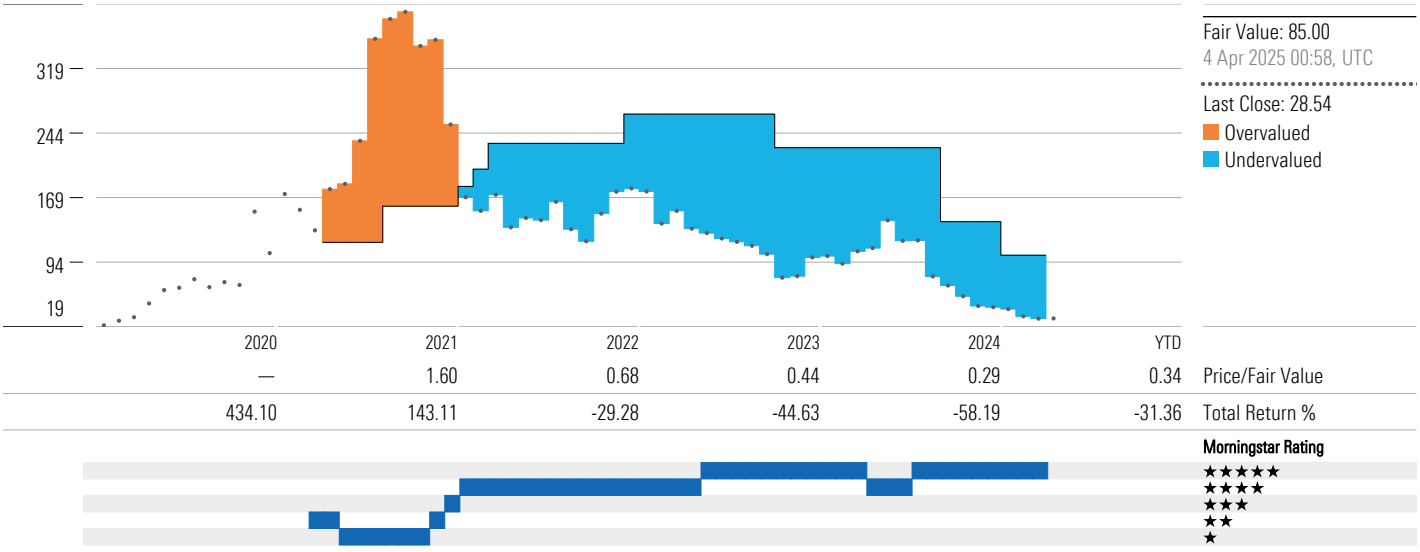
Morningstar Equity Analyst Report | Report as of 1 May 2025 13:37, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 1 of 24

Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
28.54 USD 30 Apr 2025	85.00 USD 4 Apr 2025 00:58, UTC	0.34	11.03 USD Bil 30 Apr 2025	None	Small Value	Very High	Standard	2 Apr 2025 05:00, UTC

Price vs. Fair Value



Total Return % as of 30 Apr 2025. Last Close as of 30 Apr 2025. Fair Value as of 4 Apr 2025 00:58, UTC.

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The primary analyst covering this company does not own its stock.

[1]The ESG Risk Rating Assessment is a representation of Sustainalytics' ESG Risk Rating.

Moderna Earnings: Further Cost Cuts in Tough Vaccine Environment Support Long-Term Prospects

Analyst Note Karen Andersen, CFA, Director, 1 May 2025

Following first-quarter results, Moderna maintained its 2025 outlook and lowered operating cost guidance for 2026-27, with GAAP costs expected to fall by $1.4 billion-$1.7 billion between 2025 and 2027. Management still expects to reach cash breakeven in 2028.

Why it matters: With $8.4 billion in cash left at the end of the quarter, investors are closely watching Moderna's strategy for focusing its remaining covid vaccine profits from the pandemic on its highest-priority products, which increasingly look to be oncology rather than respiratory vaccines.

- We're encouraged by Moderna's strong cost discipline in the first quarter and commitment to steep operating cost reductions over the next two years.
- Potential new launches this year are limited (updates to covid and RSV vaccines), but we expect potential 2026 launches of flu/covid, cytomegalovirus, and norovirus vaccines. We think 2027 launches could extend to oncology (intismeran/mRNA-4157) and rare diseases (propionic acidemia).

The bottom line: We're maintaining our $85 fair value estimate for no-moat Moderna, as we think recent share prices do not reflect the long-term value of the firm's pipeline.

- Moderna looks increasingly capable of weathering the next three years without additional cash raises, despite significant net losses.
- While the environment for vaccine-focused firms looks challenging in the near term, with higher

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Sector Healthcare

Industry Biotechnology

Business Description

Moderna is a commercial-stage biotech that was founded in 2010 and had its initial public offering in December 2018. The firm's mRNA technology was rapidly validated with its covid vaccine, which was authorized in the United States in December 2020. Moderna had 40 mRNA development candidates in clinical development as of September 2024. Programs span a wide range of therapeutic areas, including infectious disease, oncology, cardiovascular disease, and rare genetic diseases.

thresholds for approval and potential delays, we remain confident in Moderna's technology, and we're particularly bullish on its potential in oncology.

Coming up: We expect phase 3 intismeran data in 2026 in early-stage (adjuvant) melanoma, and phase 3 trials are continuing in early-stage lung cancers. We're also encouraged by progress with the phase 2 program, which includes kidney and bladder cancer trials.

- Moderna has prioritized a second oncology program, Checkpoint AIM-T, which is in a phase 2 study in metastatic (late-stage) cancers including melanoma and lung cancer.

Business Strategy & Outlook Karen Andersen, CFA, Director, 14 Jan 2025

Moderna's mRNA technology gained rapid validation as sales of its covid vaccine soared in 2021 and 2022, but we think the firm has yet to secure a narrow economic moat around its business, largely due to uncertainties tied to an evolving virus and the changing competitive landscape for innovative vaccines.

In a record-breaking span of just 11 months, Moderna created, developed, manufactured, and got regulatory authorization for mRNA-1273, a two-dose covid vaccine that is one of the first two mRNA vaccines ever authorized (alongside Pfizer/BioNTech's BNT162b2). The pandemic accelerated Moderna's evolution into a commercial-stage biotech, and we expect that the firm's ramp-up in manufacturing and clinical know-how will pave the way for faster timelines for additional programs. Moderna's mRNA platform, involving rapid design and similar manufacturing across programs, allows the company to pursue multiple programs in parallel. Moderna also retains full rights to most of its programs, although partnerships with Merck and Vertex help support its efforts in oncology and cystic fibrosis.

Moderna reported roughly $18 billion in covid vaccine sales in both 2021 and 2022, but with vaccine fatigue and uncertainty around the severity of covid infections, Moderna's covid vaccine sales fell to $6.7 billion in 2023 and $3 billion in 2024. We see potential for continued revenue of $2 billion annually if higher-risk populations receive annual vaccines, although there is high uncertainty around the number of long-term competitors (including new mRNA players).

Moderna launched RSV vaccine mResvia in 2024 as the third-to-market product behind GSK and Pfizer vaccines. However, the firm's pipeline progress could lead to 2025-27 launches for a covid/flu combination vaccine, stomach flu vaccine, CMV-focused vaccine for birth defects, melanoma therapy, and two rare-disease treatments. We're most bullish on Moderna and Merck's melanoma therapy, which we think has potential in a wide range of cancers in combination with Merck's Keytruda.

Bulls Say Karen Andersen, CFA, Director, 4 Apr 2025

- The stellar efficacy and safety profile of Moderna's covid vaccine offered rapid validation of the firm's mRNA technology.

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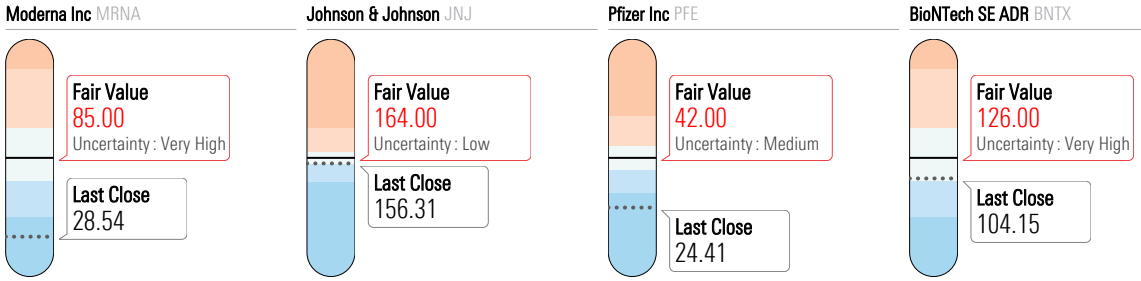
Competitors



	Moderna Inc MRNA	Johnson & Johnson JNJ	Pfizer Inc PFE	BioNTech SE ADR BNTX
Economic Moat	None	Wide	Wide	None
Currency	USD	USD	USD	USD
Fair Value	85.00 4 Apr 2025 00:58, UTC	164.00 19 Sep 2022 11:58, UTC	42.00 13 Dec 2023 17:41, UTC	126.00 11 Mar 2025 01:13, UTC
1-Star Price	148.75	205.00	56.70	220.50
5-Star Price	42.50	131.20	29.40	63.00
Assessment	Undervalued 30 Apr 2025	Undervalued 30 Apr 2025	Undervalued 30 Apr 2025	Fairly Valued 30 Apr 2025
Morningstar Rating	★★★★★30 Apr 2025 22:08, UTC	★★★★30 Apr 2025 21:45, UTC	★★★★★30 Apr 2025 21:45, UTC	★★★30 Apr 2025 22:06, UTC
Analyst	Karen Andersen, Director	Karen Andersen, Director	Karen Andersen, Director	Jay Lee, Senior Equity Analyst
Capital Allocation	Standard	Standard	Standard	Standard
Price/Fair Value	0.34	0.95	0.58	0.83
Price/Sales	3.43	4.25	2.23	8.41
Price/Book	1.01	4.81	1.57	1.24
Price/Earning	—	19.35	7.60	—
Dividend Yield	0.00%	3.17%	6.92%	0.00%
Market Cap	11.03 Bil	376.09 Bil	138.44 Bil	25.04 Bil
52-Week Range	23.15—170.47	140.68—169.99	20.92—31.54	76.53—131.49
Investment Style	Small Value	Large Value	Large Value	—

- Its mRNA technology could allow the firm to compete in a wide range of therapeutic areas, from other prophylactic vaccines (like influenza and other viruses) to enzyme replacement (various rare diseases) to cancer.
- Moderna's cash infusion from covid vaccine sales in 2021-22, as well as newly established large-scale manufacturing facilities, positions the firm to rapidly develop new pipeline programs.

Bears Say Karen Andersen, CFA, Director, 4 Apr 2025

- Moderna's Alexion partnership was terminated in 2017 after failure to find a safe but effective dose for the lead program, which could foreshadow difficulty finding a therapeutic window beyond low-dose vaccine programs.
- Continued evolution of less threatening variants and society's vaccine fatigue could significantly reduce demand for Moderna's covid vaccine.
- Established, non-mRNA competition in RSV and influenza could make it difficult for Moderna to gain

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market share with new vaccines.

Economic Moat Karen Andersen, CFA, Director, 4 Apr 2025

The stellar safety and efficacy profile of Moderna's covid vaccine rapidly validated the firm's mRNA technology, and we expect returns on invested capital to return above our 9% assumed cost of capital beginning in 2031. However, we see threats of major value destruction that preclude us from awarding a narrow moat rating to the firm. Moderna served a critical role in vaccinating millions of individuals during the pandemic and has several potential first-in-class vaccines in testing that could serve significant unmet needs. We think it has both the funding and the technological capabilities already in house to bring most of these programs to market. However, we see uncertainty around its defenses against other novel mRNA vaccine market entrants, and we think the firm is still in the process of building a moat, as we expect multiple new competitors in the coming years.

Despite the early lead that Moderna and BioNTech hold after developing their covid vaccines in less than a year, and their clear dominance in covid vaccine sales, the long-term covid vaccine market is mired in uncertainty. The virulence of new strains and the population's willingness to continue to get vaccinated remain key questions. We assume that many high-risk individuals in developed markets continue to get annual vaccines, although we do not assume regular vaccination for healthy adults, leading us to a roughly $2 billion annual opportunity for Moderna, well below peak sales near $18 billion annually in 2021 and 2022. Moderna continues to innovate in this space, with updated boosters as well as differentiated programs like next-generation vaccine mRNA-1283 (to launch in 2025), which is more stable at refrigerated temperatures and effective at a lower dose.

With both the efficacy/safety of the technology and the ability to scale manufacturing now largely validated, we think this lowers the risk the firm faces as it expands into other markets and also shortens timelines for further development. Moderna's ability to launch differentiated mRNA therapies beyond covid, ranging from prophylactic vaccines for other respiratory diseases to cancer treatments, will be key to establishing a moat, in our opinion. Multiple competitors are lining up that could interfere with Moderna's potential to see the kind of monopoly pricing power enjoyed by other innovative vaccines (GSK's Shingrix, Pfizer's Prevnar) launched in recent years. Moderna's platform technology allows new genetic sequences to be easily inserted to create new therapies, and virtually identical, cell-free, low-volume manufacturing across programs should allow flexible manufacturing, but these characteristics—which allowed it to vault to the lead ahead of older technologies during the pandemic—could also make it more vulnerable to other competitors with similar technologies.

Moderna's intellectual property is strong and multilayered, similar in nature to IP at other oligonucleotide-focused firms like Alnylam and Ionis, although the precise technology is different. Moderna's medicines use mRNA, which the company refers to as "the software of life," to deliver instructions for a patient's own body to produce a given protein, which can either trigger an immune

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reaction (prophylactic vaccines like the covid vaccine, or oncology vaccine programs) or replace a protein that is missing or faulty. Moderna's IP protection stems from the firm's broad mRNA technology (including sublicensed patents), formulation (including methods of using specific, proprietary lipid nanoparticle delivery technologies), and also the exact composition of matter (encoded antigen) for individual products. Protection extends through at least 2033 for issued patents and beyond 2041 for pending patents. Moderna gained access to valuable patents from the University of Pennsylvania covering modified mRNA technology through a nonexclusive license (via mRNA RiboTherapeutics and its affiliate, Cellscript), so other firms could also license the fundamental technology allowing mRNA to function as a therapeutic. In fact, while Moderna, CureVac, BioNTech, and GSK historically dominated mRNA vaccine patent applications, the success of covid vaccines has likely led to an explosion of patent applications for other innovators. It is possible that Moderna's experience with artificial intelligence and proprietary digital technologies could allow it to design the best mRNA sequences for protein expression, and pandemic vaccine profits could give it an edge in ongoing proprietary work on new delivery technologies and lipid nanoparticles. However, we're not convinced that Moderna has erected enough barriers to competitors, given the significant funding flowing into this nascent and extremely promising market where Moderna and BioNTech have laid the foundation.

Moderna's mRNA platform has yielded a pipeline that can be sorted into seven different modalities, or groups that share features like delivery technology, methods of controlling immune system interactions, and manufacturing technology. Infectious-disease vaccines are the key initial focus, with combination or complex vaccines as potential differentiators. With manufacturing rapidly brought to a massive scale, we think Moderna's technology platform could be applied in numerous areas but looks particularly promising and well validated in other prophylactic vaccine markets. These vaccines require a finite number of small doses of mRNA and have shown positive efficacy data (strong ability to generate neutralizing antibodies) against several different viruses beyond covid, and Moderna has several such programs in clinical development.

Among Moderna's infectious-disease vaccine programs, endemic respiratory viruses are a key target and the lowest-risk programs, thanks to similarities to covid vaccines. For example, Moderna aims to launch a combination covid/influenza vaccine in 2026. While the $6 billion global influenza vaccine market is already crowded and has poor pricing power, Moderna's technology appears to allow higher efficacy than traditional vaccines, which in a good year are only 60% effective. With a shorter lead time due to faster manufacturing (traditional vaccines take six to nine months, but mRNA vaccines, once manufacturing and approval pathways are established, could perhaps take one to two months), Moderna should see a higher likelihood of targeting the key strains that will circulate in the upcoming season. This would also mean less time to allow for antigenic drift (accumulating mutations in the virus strains), and manufacturing outside of egg-based systems would avoid the problem of egg adaptation (the antigen code changing during manufacturing). The convenience of a combination shot could draw

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some of the 150 million Americans who receive a flu shot each year to receive Moderna's combination shot instead. Beyond influenza, positive phase 3 data for the firm's RSV vaccine mResvia led to a launch in time for the 2024-25 season, although it is facing tough competition from Pfizer and GSK vaccines launched in 2023.

Competition could come from established vaccine firms partnering with innovative mRNA firms (GSK/CureVac and Sanofi's Translate acquisition), other mRNA firms (BioNTech), or vaccines using other technologies (including Pfizer's and GSK's protein-based RSV vaccines). That said, mRNA technology theoretically allows vaccination against multiple pathogens at once. The broader the menu of first-in-class vaccines, the more entrenched Moderna could become. Moderna is also tackling vaccines that are complex and difficult to manufacture with established methods. Moderna's CMV vaccine program includes six pieces of mRNA that create protein subunits that self-assemble inside the cell. Moderna aims to establish differentiation with its ability to target such a complex antigen, and we expect the firm could launch as early as 2026 in this nascent vaccine market. Epstein-Barr virus and HIV are other programs that are likely to be defined by their complexity, which could make it difficult for other non-mRNA vaccines to compete.

In oncology, Moderna aims to activate a cancer patient's T-cells by administering mRNA coding for neoantigens (antigens that are unique to tumor cells). One approach, partnered with Merck, is an individualized neoantigen therapy that treats cancer by administering mRNA coding for multiple tumor neoantigens that T-cells can recognize, allowing a patient's immune system to recognize tumors more easily. Moderna and Merck have reported positive data for mRNA-4157 in a phase 2 melanoma trial, and we assume a 60% probability of success and multi-billion-dollar sales potential, with even higher potential if successful in new indications like lung cancer.

Beyond infectious diseases and cancer, we think Moderna's pipeline risk increases, although recent data is showing strong potential efficacy and durability. For example, intracellular and membrane-associated proteins make up two thirds of all human proteins but can't be delivered using recombinant proteins (intravenously administered biologic therapies can't enter cells), making them potential targets for mRNA therapies. Moderna is focused on treating rare diseases in this modality and has two programs with early promising data that are entering pivotal development (we assign probabilities of approval of 50%).

Fair Value and Profit Drivers Karen Andersen, CFA, Director, 4 Apr 2025

We've lowered our fair value estimate to $85 per share from $102 following a series of events at the Food and Drug Administration that we believe could make it harder for Moderna to gain new and expanded approvals for its vaccines.

The company is facing several headwinds that are making its previously aggressive R&D strategy less

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feasible, including weak demand for covid vaccines, entrenched competition in RSV, no accelerated approval pathway for its melanoma treatment, and a shrinking pool of cash from pandemic covid vaccine profits. Moderna is therefore focusing its cash and R&D efforts on 10 programs it sees as likely to reach the market by 2027, with estimated breakeven pushed back to 2028. We've cut our 2028 revenue forecast from $6.4 billion to $5.5 billion, which is only slightly below Moderna's $6 billion guidance for 2028.

We think mRNA-1273, the company's authorized covid vaccine, should generate roughly $2 billion in annual sales in 2025 and beyond, due to recurring boosters in high-risk populations. We expect that Moderna's launches of prophylactic infectious-disease vaccines for RSV (2024) and a covid/influenza combination (2026) will help support sales growth, although competition could slow the sales trajectory. We assume $7 billion in annual infectious-disease vaccine sales outside of covid by 2034. We assume a 60% probability of approval for Merck and Moderna's personalized cancer vaccine, mRNA-4157, and we expect Moderna could record $3 billion in sales from the program by 2034. We include $1 billion in annual sales from rare-disease therapeutics by 2034 (20%-50% probabilities of approval). Overall, this results in more than $14 billion in total probability-adjusted annual revenue by 2034. We expect operating margins will surpass 30% by 2031 and model long-term margins above 40%, even with continued strong investment in research and development. We assign Moderna an average level of systemic risk, resulting in a cost of equity (and weighted average cost of capital) of 9%, in line with its early commercial-stage biotech peers.

Risk and Uncertainty Karen Andersen, CFA, Director, 4 Apr 2025

We assign Moderna a Very High Morningstar Uncertainty Rating, given the potential for rapid changes in the competitive landscape and in the covid virus itself. Beyond covid, Moderna's technology is still largely unproved, and competing technologies could prove safer and more effective. In addition, potential changes to regulatory policy and review at the Food and Drug Administration during the Trump administration could make it more difficult for vaccines to gain expanded labels or new approvals.

Our rating for Moderna is not materially affected by environmental, social, and governance risks, although we see access to basic services (tied to potential US policy reform on drug pricing, and vaccine hesitancy) as the biggest potential ESG risk that Moderna needs to manage. Vaccine hesitancy could plague vaccine-focused firms like Moderna if new concerns about safety issues begin to emerge from the firm's novel mRNA vaccines, or if Robert F. Kennedy Jr. continues to spread skepticism about vaccines in his new role as head of the Department of Health and Human Services. We model this into our demand assumptions, but this is immaterial to our valuation (less than 10% impact).

On product governance, safety issues could also be a source of litigation costs for Moderna in the long run. That said, as millions of individuals have received Moderna's covid vaccine with no serious side effects, we assume less than a 25% probability of significant litigation occurring, and we don't include

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potential future litigation costs in our valuation model.

Capital Allocation Karen Andersen, CFA, Director, 4 Apr 2025

We assign Moderna a Standard Capital Allocation Rating. The rating reflects our belief that Moderna possesses a sound balance sheet, fair investments outlook, and appropriate shareholder distributions. With no debt and significant cash boosts from equity raises in 2020 and covid vaccine sales in 2021 and 2022, we have no concerns regarding Moderna's balance sheet, although we're carefully watching the firm's cash balance as it manages R&D spending. The mRNA treatment landscape is shaping up to be competitive, but the market is also nascent, with the covid pandemic marking the first commercial product from Moderna, the industry leader. We think Moderna is positioned to create economic value by continuing to reinvest in its business. We think the firm's rapid development timeline during the pandemic shows strong execution with its clinical, manufacturing, and commercial investments, as Moderna quickly transformed from a development-stage biotech into a global, large-scale vaccine maker. On distributions, Moderna's massive potential for building a moat by applying its technology to new pipeline programs likely means that dividends remain far in its future, although significant 2021 cash flow and a dip in Moderna's share price drove some share repurchases in 2021-23. Overall, we think the firm's aggressive spending on R&D supports its strategy for advancing several new vaccines and treatments to the market, although a strategic reprioritization will focus efforts on 10 key programs that could launch by 2027.

Analyst Notes Archive

Moderna: FDA Climate Looks Increasingly Hostile, Leading Us to a Lower FVE Karen Andersen, CFA,Director,4 Apr 2025

Since Robert F. Kennedy Jr. was confirmed as secretary of the Department of Health and Human Services on Feb. 13, recent disruptions at the Food and Drug Administration include a return-to-office mandate, massive layoffs, and the resignation of top vaccine official Peter Marks on March 28. Why it matters: Moderna's covid vaccine was ushered to the market under the watch of Marks, and his departure could signify that Kennedy's personal skepticism of vaccines is making its way into FDA policy and product reviews. Moderna is expecting two approvals in the near term for a next-generation covid vaccine (May 31) and expanded approval of an RSV vaccine in high-risk adults (June 12), and the mRNA firm will need FDA support for six additional potential approvals by the end of 2027. Beyond policy, Kennedy's plan to begin a study of vaccines and their potential link to autism (already heavily studied and disproven) could further erode society's confidence in vaccines, although we think falling vaccination rates could be self-correcting if outbreaks become more common. The bottom line: We're lowering our fair value estimate for no-moat Moderna to $85 per share, down from $102, after lowering our sales assumptions for its RSV vaccine and reducing the probability of approval for its covid/flu vaccine, incorporating regulatory risk on label expansion (RSV) and approval (covid/flu). Even with this

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haircut to our sales estimates, Moderna still trades at a dramatic discount to our valuation. We think the market is failing to incorporate the value of Moderna's mRNA technology and deep pipeline across vaccines, cancer, and rare disease therapeutics. Bears say: Beyond potentially tougher vaccine approvals and slower review times across products, Moderna could see pressure stemming from changes to liability protection for its covid vaccine. If Kennedy were to remove such protections, lawsuits could emerge from individuals who believe they were harmed by the vaccine.

Moderna Earnings: Maintaining Our $102 Fair Value Estimate as Long-Term Pipeline and Strategy Intact Karen Andersen, CFA,Director,14 Feb 2025

Moderna confirmed revenue of $3.2 billion and a net loss of nearly $3.6 billion for 2024, consistent with preliminary results released Jan. 13. Management also confirmed guidance for $1.5 billion-$2.5 billion in 2025 revenue and additional, smaller cost cuts over the next two years.Why it matters: Investors are closely watching Moderna's ability to execute on its plan to use its $9.5 billion cash balance and profits from covid and RSV vaccine sales to drive its late-stage pipeline to market. Management's revenue guidance for 2025 bakes in continued lower covid market share and vaccination rates at the midpoint, as well as some uncertainty around new manufacturing facility licensures in the UK, Canada, and Australia. With only $25 million in RSV vaccine sales in 2024, we don't think significant expansion of mResvia sales is built into guidance, as RSV vaccine market incumbents Pfizer and GSK saw declining sales in 2024 due to narrower guidelines and uncertainty around the need for revaccination.The bottom line: We're maintaining our $102 fair value estimate for no-moat Moderna following management's confirmed 2024 results and 2025 guidance. We continue to see the pipeline as significantly undervalued even after accounting for the very high uncertainty we see around the shares. In 2025, we expect final data from the phase 3 trial of Moderna's cytomegalovirus vaccine, as well as interim analysis from phase 3 influenza and norovirus vaccine trials after a tough winter season that will likely mean significant case accruals (faster results). We think the phase 3 trial of individualized neoantigen therapy mRNA-4157 in adjuvant melanoma is likely to produce data in 2026, putting it on track for a 2027 potential launch with partner Merck. Bears say: Robert F. Kennedy Jr. was confirmed as secretary of the Department of Health and Human Services on Feb. 13, and he has a wide range of potential actions available to him in his new position.

Moderna: Fair Value Cut Following Lower 2025 Sales Guidance and CMV Vaccine Uncertainty Karen Andersen, CFA,Director,14 Jan 2025

On Jan.13, Moderna cut its 2025 sales guidance to $1.5 billion-$2.5 billion, down from prior guidance of $2.5 billion-$3.5 billion, partly due to waning covid vaccine demand and a slow RSV vaccine launch. Also, a phase 3 trial of its CMV vaccine did not meet an efficacy hurdle for an early readout.Why it matters: Reduced expectations and depressed shares pressure the firm to increase revenue and reduce its cash burn rate to avoid diluting shareholders by selling shares near recent lows. Moderna ended

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2024 with $9.5 billion in cash but had a burn rate of $4 billion in 2024. With planned cost controls, we assume Moderna can conserve enough cash to avoid dilution near recent lows. The bottom line: We lower our fair value estimate for no-moat Moderna to $102 per share from $141, after incorporating lower guidance for sales and additional cost-cutting. Even after accounting for the Very High Morningstar Uncertainty Rating we assign to Moderna, we think shares look very undervalued. We've reduced our assumed probability of approval for the CMV vaccine to 40% from 70%, as we think failure to hit the early efficacy endpoint creates uncertainty. Borderline data could make it more difficult to gain approval in a new administration that is more skeptical of vaccines. We've reduced our operating expense assumptions in 2025 and beyond to account for cost controls, but we don't see this providing much offset to our valuation, as it also likely delays or reduces the firm's pipeline prospects. Coming up: We think Moderna will be able to supplement its current portfolio with a next-generation covid vaccine and broader approval for its RSV vaccine among high-risk adults later this year. In 2026, we expect the firm could launch a covid/flu combination vaccine for adults age 50 and up, but also a CMV vaccine, norovirus (stomach flu) vaccine, and two rare disease treatments. We remain very bullish on the firm's cancer program, with a launch in melanoma still poised for 2027.

More Trump Healthcare Nominations Largely Aligned With Kennedy Karen Andersen, CFA,Director,2 Dec 2024

Following President-elect Donald Trump's Nov. 14 announcement of the nomination of Robert F. Kennedy Jr. as secretary of the US Department of Health and Human Services, there have seen several more nominations for leadership in the 13 HHS divisions, including Dr. Mehmet Oz (Centers for Medicare and Medicaid Services) on Nov. 19, Dr. Marty Makary (US Food and Drug Administration) and Dr. Dave Weldon (Centers for Disease Control and Prevention) on Nov. 22, and Dr. Jay Bhattacharya (National Institutes of Health) on Nov. 26. Overall, we think these selections show a consistent theme of introducing potential disruptive forces to US healthcare, although their lack of experience and the power of career staffers in these agencies could serve to blunt any significant proposed changes. We continue to see obesity drugs and vaccines as areas of potential scrutiny, although without any clarity on proposals, we're not making any changes to our fair value estimates following these announcements.As discussed in our Nov. 18 note, we think biopharma industry tailwinds under the new Trump administration could include repealing the Medicare negotiation provision in the Inflation Reduction Act, less Federal Trade Commission scrutiny of acquisitions, as well as continued lower corporate taxes. However, Kennedy's skepticism of vaccine and obesity drug benefits could erode public trust and we think his team could slow the approval of new drugs and vaccines and de-emphasize CDC vaccine guidelines. Views on obesity drugs will likely be front and center in 2025, given the proposed rule from the Biden administration to expand obesity drug coverage in Medicare and Medicaid and the upcoming announcement of the 2027 list of negotiated drugs (which is likely to include Novo Nordisk's semaglutide). The Trump administration would need to finalize the rule and we expect Kennedy will be

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Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
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conflicted over whether to discourage reliance on weight loss drugs or reduce obesity drug costs significantly.

Trump's Nomination of RFK Jr. to Lead HHS a Potential Industry Headwind Karen Andersen, CFA,Director,18 Nov 2024

President-elect Donald Trump announced on Nov. 14 that he is nominating Robert F. Kennedy Jr. to be secretary of the Department of Health and Human Services under his new administration in 2025. RFK Jr. has strong views on public health and, if confirmed, could use his position to make changes at several of the 13 HHS divisions. In our Nov. 8 note, we discussed the potential tailwinds of a Trump administration, including possible repeal of the Medicare negotiation provision in the Inflation Reduction Act, less Federal Trade Commission scrutiny of acquisitions, and a likely continuation of lower corporate taxes. However, if RFK's nomination is confirmed, we expect more "wild card" headwinds to the industry will come to fruition. As the HHS covers the US Food and Drug Administration and the Centers for Disease Control and Prevention, an HHS secretary skeptical of vaccine and obesity drug benefits could work to erode public trust, put up roadblocks for approval of new vaccines, and prevent the CDC from recommending any vaccines that make it through the approval process. With less federal guidance, we think it is possible certain states could waver in support of broad mandates for childhood vaccines. All of these could weigh on sales of vaccines in the US, including covid vaccine makers Moderna and BioNTech and big biopharma vaccine makers like GSK (we model 14% of GSK revenue from US vaccine sales in 2024), Pfizer (12%), Merck (9%), and Sanofi (6%).If RFK Jr. is confirmed, we may lower our US vaccine sales estimates, although we don't think reductions would be long-lasting, and we don't yet see this as a significant hit to our valuations. Broad international price benchmarks could be a bear-case scenario under RFK Jr., which may increase our Morningstar Uncertainty Ratings. That said, any proposal would likely start with a smaller portion of the Medicare market and not extend to private markets, and we would be unlikely to include this in our fair value estimates.

Moderna Earnings: Maintaining Our $141 Fair Value Estimate as Turnaround Looks on Track Karen Andersen, CFA,Director,7 Nov 2024

We're maintaining our $141 fair value estimate for Moderna following strong third-quarter sales and a brief return to profitability, ahead of an expected dip in sales in the fourth quarter. Moderna reported $1.8 billion in covid vaccine revenue in the third quarter, with $1.2 billion from US sales. This season's earlier US approval and launch pulled some of Moderna's covid vaccine demand forward from the fourth quarter, and Moderna maintained its guidance for $3 billion-$3.5 billion in product sales for 2024; our own forecast remains at the low end of this range. We continue to think Moderna lacks an economic moat due to the competitive landscape in the vaccine market, although we think it is in the process of building competitive advantages if its late-stage mRNA-based pipeline can translate into successful commercial products beyond the covid vaccine. We think the firm's operating expense

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Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
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control and prioritization of key programs puts Moderna on track to return to maintainable profitability in 2028, likely with a broad portfolio of vaccines and treatments, and we see shares as significantly undervalued. We also see upcoming data for the firm's CMV vaccine (which could report out later this year) as a potential catalyst for shares, as well as initial pivotal data for the first of the firm's rare disease programs. Oncology and norovirus programs also stand out as significant long-term revenue drivers, with launches possible in 2027.Beyond the covid vaccine market, Moderna reported $10 million in sales for its new RSV vaccine mResvia, which was essentially locked out of the 2024-25 season for RSV vaccines due to the timing of the contracting season and established competition from GSK and Pfizer. We expect Moderna to expand mResvia's label in line with its competitors and to be a more viable competitor in the third quarter of 2025 as the next season begins.

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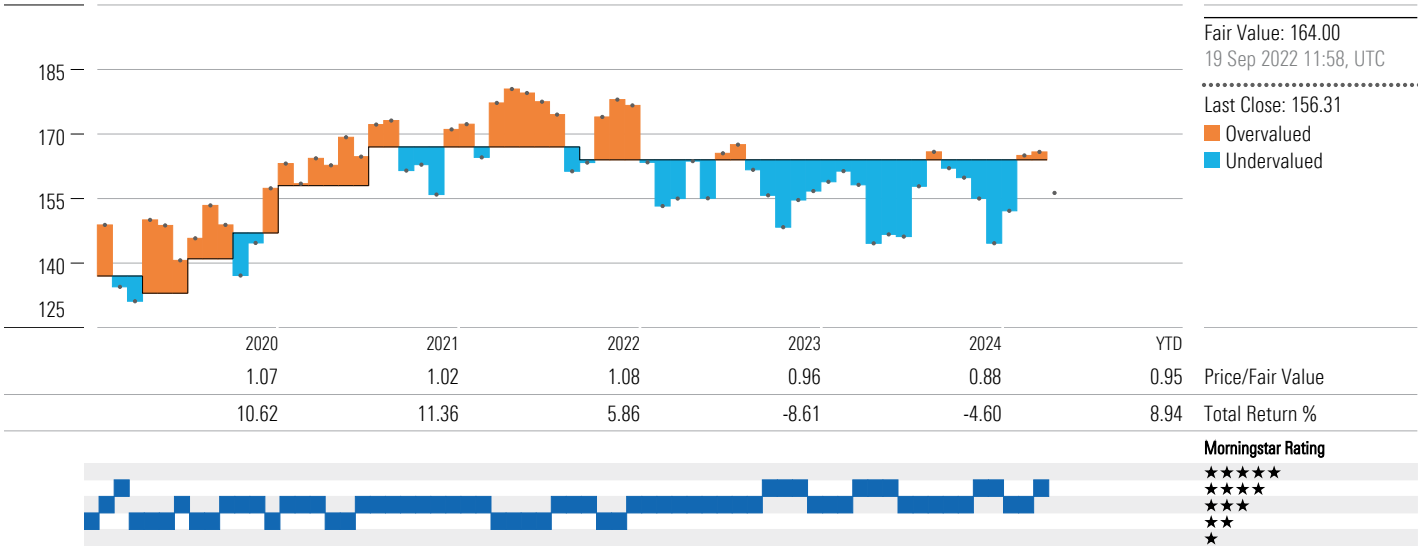
Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Competitors Price vs. Fair Value

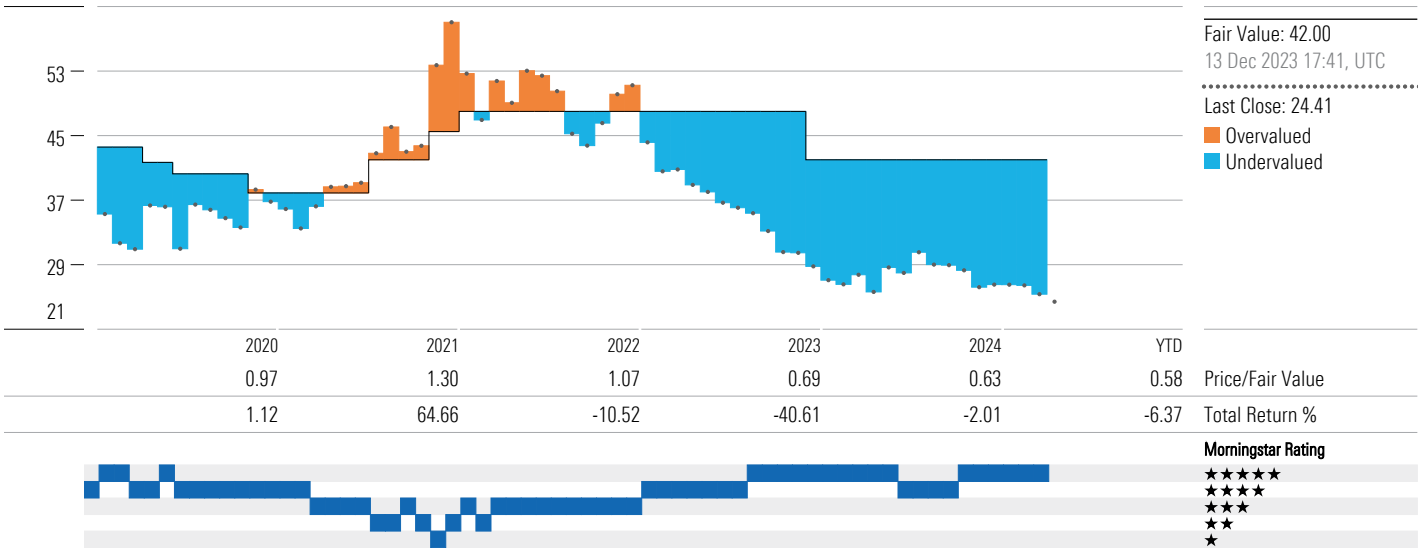
Johnson & Johnson JNJ



	2020	2021	2022	2023	2024	YTD	
	1.07	1.02	1.08	0.96	0.88	0.95	Price/Fair Value
	10.62	11.36	5.86	-8.61	-4.60	8.94	Total Return %

Total Return % as of 30 Apr 2025. Last Close as of 30 Apr 2025. Fair Value as of 19 Sep 2022 11:58, UTC.

Pfizer Inc PFE



	2020	2021	2022	2023	2024	YTD	
	0.97	1.30	1.07	0.69	0.63	0.58	Price/Fair Value
	1.12	64.66	-10.52	-40.61	-2.01	-6.37	Total Return %

Total Return % as of 30 Apr 2025. Last Close as of 30 Apr 2025. Fair Value as of 13 Dec 2023 17:41, UTC.

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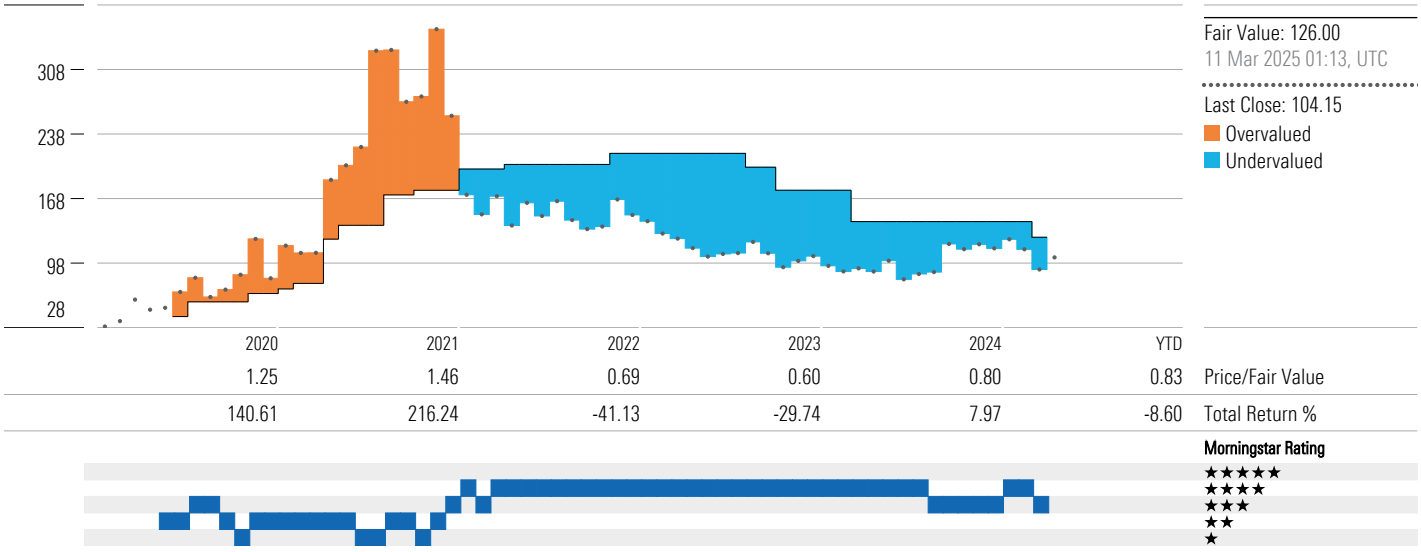
Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Competitors Price vs. Fair Value

BioNTech SE ADR BNTX



	2020	2021	2022	2023	2024	YTD	
	1.25	1.46	0.69	0.60	0.80	0.83	Price/Fair Value
	140.61	216.24	-41.13	-29.74	7.97	-8.60	Total Return %

Total Return % as of 30 Apr 2025. Last Close as of 30 Apr 2025. Fair Value as of 11 Mar 2025 01:13, UTC.

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Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
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Morningstar Valuation Model Summary

Financials as of 01 May 2025

Fiscal Year, ends 31 Dec	Actual 2022	2023	2024	Forecast 2025	2026	2027	2028	2029
Revenue (USD Mil)	19,263	6,848	3,236	2,461	2,959	4,136	5,479	7,487
Operating Income (USD Mil)	9,420	-4,239	-3,945	-3,847	-2,791	-914	-21	1,237
EBITDA (USD Mil)	9,723	-3,704	-3,819	-3,649	-2,582	-695	209	1,478
Adjusted EBITDA (USD Mil)	9,723	-3,704	-3,819	-3,649	-2,582	-695	209	1,478
Net Income (USD Mil)	8,362	-4,714	-3,561	-3,648	-2,591	-814	29	1,162
Adjusted Net Income (USD Mil)	8,362	-4,714	-3,561	-3,648	-2,591	-814	29	1,162
Free Cash Flow To The Firm (USD Mil)	5,272	-4,854	-4,307	-3,705	-3,073	-1,207	-431	583
Weighted Average Diluted Shares Outstanding (Mil)	416	382	384	384	384	384	384	384
Earnings Per Share (Diluted) (USD)	20.10	-12.34	-9.27	-9.50	-6.75	-2.12	0.08	3.03
Adjusted Earnings Per Share (Diluted) (USD)	20.10	-12.34	-9.27	-9.50	-6.75	-2.12	0.08	3.03
Dividends Per Share (USD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Margins & Returns as of 01 May 2025

	3 Year Avg	Actual 2022	2023	2024	Forecast 2025	2026	2027	2028	2029	5 Year Avg
Operating Margin %	-46.1	48.9	-61.9	-121.9	-156.4	-94.3	-22.1	-0.4	16.5	-51.3
EBITDA Margin %	—	50.5	-54.1	-118.0	-148.3	-87.3	-16.8	3.8	19.8	—
Adjusted EBITDA Margin %	—	50.5	-54.1	-118.0	-148.3	-87.3	-16.8	3.8	19.8	-45.8
Net Margin %	-45.1	43.4	-68.8	-110.0	-148.3	-87.5	-19.7	0.5	15.5	-47.9
Adjusted Net Margin %	-45.2	43.4	-68.8	-110.0	-148.3	-87.5	-19.7	0.5	15.5	-47.9
Free Cash Flow To The Firm Margin %	-58.9	27.4	-70.9	-133.1	-150.6	-103.8	-29.2	-7.9	7.8	-56.7

Growth & Ratios as of 01 May 2025

	3 Year CAGR	Actual 2022	2023	2024	Forecast 2025	2026	2027	2028	2029	5 Year CAGR
Revenue Growth %	-44.0	4.3	-64.5	-52.8	-24.0	20.3	39.8	32.5	36.7	18.3
Operating Income Growth %	—	-29.2	-145.0	-6.9	-2.5	-27.5	-67.3	-97.7	-6019.5	—
EBITDA Growth %	-54.3	-28.0	-138.1	3.1	-4.5	-29.2	-73.1	-130.0	608.0	74.2
Adjusted EBITDA Growth %	-165.7	-28.0	-138.1	3.1	-4.5	-29.2	-73.1	-130.0	608.0	-182.7
Earnings Per Share Growth %	—	-29.0	-161.4	-24.9	2.5	-29.0	-68.6	-103.6	3894.0	—
Adjusted Earnings Per Share Growth %	—	-29.0	-161.4	-24.9	2.5	-29.0	-68.6	-103.6	3894.0	—

Valuation as of 01 May 2025

	Actual 2022	2023	2024	Forecast 2025	2026	2027	2028	2029
Price/Earning	8.9	-8.1	-4.5	-3.0	-4.2	-13.5	356.8	9.4
Price/Sales	3.6	5.5	5.0	4.5	3.7	2.7	2.0	1.5
Price/Book	3.9	2.7	1.5	1.5	2.4	2.8	2.8	2.2
Price/Cash Flow	—	—	—	—	—	—	—	—
EV/EBITDA	6.4	-8.6	-2.8	-1.3	-1.8	-6.8	22.8	3.2
EV/EBIT	6.6	-7.5	-2.7	-1.2	-1.7	-5.2	-227.6	3.8
Dividend Yield %	—	—	—	—	—	—	—	—
Dividend Payout %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Free Cash Flow Yield %	—	—	—	—	—	—	—	—

Operating Performance / Profitability as of 01 May 2025

Fiscal Year, ends 31 Dec	Actual 2022	2023	2024	Forecast 2025	2026	2027	2028	2029
ROA %	32.3	-25.6	-25.2	-34.9	-33.1	-11.6	0.4	14.0
ROE %	43.7	-34.0	-32.7	-50.3	-55.6	-21.2	0.8	23.1
ROIC %	148.4	-0.9	-3.3	-6.8	-5.6	-2.1	1.2	5.5

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Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
28.54 USD 30 Apr 2025	85.00 USD 4 Apr 2025 00:58, UTC	0.34	11.03 USD Bil 30 Apr 2025	None	Small Value	Very High	Standard	2 Apr 2025 05:00, UTC

Financial Leverage (Reporting Currency)	Actual			Forecast				
Fiscal Year, ends 31 Dec	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Debt/Capital %	1.7	3.2	4.5	2.1	1.9	1.8	1.6	1.5
Assets/Equity	1.4	1.3	1.3	1.4	1.7	1.8	1.8	1.6
Net Debt/EBITDA	-0.9	2.0	1.6	1.4	0.9	1.9	-4.4	-1.1
Total Debt/EBITDA	0.1	-0.3	-0.2	-0.2	-0.3	-1.1	3.6	0.5
EBITDA/ Net Interest Expense	-48.6	9.7	9.5	17.7	12.9	7.0	-4.2	-29.6

Forecast Revisions as of 1 May 2025	2025		2026		2027	
Prior data as of 3 Apr 2025	**Current**	**Prior**	**Current**	**Prior**	**Current**	**Prior**
Fair Value Estimate Change (Trading Currency)	85.00	85.09	—	—	—	—
Revenue (USD Mil)	2,461	2,497	2,959	3,009	4,136	4,236
Operating Income (USD Mil)	-3,847	-3,903	-2,791	-3,041	-914	-1,764
EBITDA (USD Mil)	-3,649	-3,705	-2,582	-2,832	-695	-1,545
Net Income (USD Mil)	-3,648	-3,723	-2,591	-2,841	-814	-1,664
Earnings Per Share (Diluted) (USD)	-9.50	-9.70	-6.75	-7.40	-2.12	-4.33
Adjusted Earnings Per Share (Diluted) (USD)	-9.50	-9.70	-6.75	-7.40	-2.12	-4.33
Dividends Per Share (USD)	0.00	0.00	0.00	0.00	0.00	0.00

Key Valuation Drivers as of 01 May 2025

Cost of Equity %	9.0
Pre-Tax Cost of Debt %	6.5
Weighted Average Cost of Capital %	9.0
Long-Run Tax Rate %	21.0
Stage II EBI Growth Rate %	10.0
Stage II Investment Rate %	40.0
Perpetuity Year	11

Additional estimates and scenarios available for download at https://pitchbook.com/.

Discounted Cash Flow Valuation as of 01 May 2025

	USD Mil
Present Value Stage I	419
Present Value Stage II	1,155
Present Value Stage III	23,520
Total Firm Value	**25,094**
Cash and Equivalents	9,533
Debt	747
Other Adjustments	-1,970
Equity Value	**31,910**
Projected Diluted Shares	384
Fair Value per Share (USD)	**85.00**

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Moderna Inc MRNA ★★★★★ 30 Apr 2025 22:08, UTC

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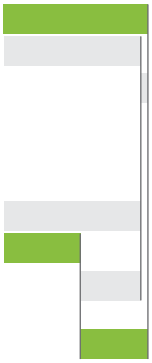
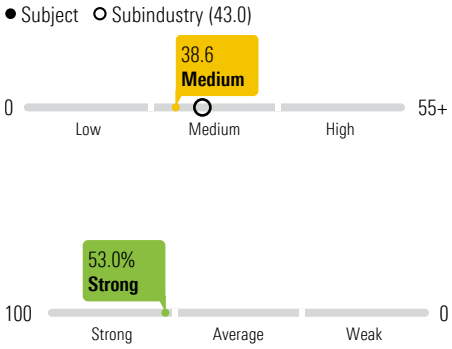
ESG Risk Rating Breakdown

Exposure	
Company Exposure[1]	38.6
– Manageable Risk	36.7
Unmanageable Risk[2]	**1.9**
Management	
Manageable Risk	36.7
– Managed Risk[3]	19.4
Management Gap[4]	**17.2**
Overall Unmanaged Risk	**19.2**





- Exposure represents a company's vulnerability to ESG risks driven by their business model
- Exposure is assessed at the Subindustry level and then specified at the company level
- Scoring ranges from 0-55+ with categories of low, medium, and high-risk exposure

- Management measures a company's ability to manage ESG risks through its commitments and actions
- Management assesses a company's efficiency on ESG programs, practices, and policies
- Management score ranges from 0-100% showing how much manageable risk a company is managing

ESG Risk Rating

ESG Risk Ratings measure the degree to which a company's value is impacted by environmental, social, and governance risks, by evaluating the company's ability to manage the ESG risks it faces.

1. A company's Exposure to material ESG issues 2. Unmanageable Risk refers to risks that are inherent to a particular business model that cannot be managed by programs or initiatives 3. Managed Risk = Manageable Risk multiplied by a Management score of 53.0% 4. Management Gap assesses risks that are not managed, but are considered manageable 5. ESG Risk Rating Assessment = Overall Unmanaged Risk = Management Gap plus Unmanageable Risk

ESG Risk Rating Assessment[5]

ESG Risk Rating is of Apr 02, 2025. Highest Controversy Level is as of Apr 08, 2025. Sustainalytics Subindustry: Biotechnology. Sustainalytics provides Morningstar with company ESG ratings and metrics on a monthly basis and as such, the ratings in Morningstar may not necessarily reflect current Sustainalytics' scores for the company. For the most up to date rating and more information, please visit: sustainalytics.com/esg-ratings/.

Peer Analysis 02 Apr 2025

Peers are selected from the company's Sustainalytics-defined Subindustry and are displayed based on the closest market cap values

Company Name	Exposure			Management			ESG Risk Rating		
Moderna Inc	38.6 | Medium	0	55+	53.0 | Strong	100	0	19.2 | Low	0	40+
Amgen Inc	41.2 | Medium	0	55+	47.8 | Average	100	0	22.5 | Medium	0	40+
Johnson & Johnson	47.1 | Medium	0	55+	62.2 | Strong	100	0	19.9 | Low	0	40+
Pfizer Inc	44.3 | Medium	0	55+	63.4 | Strong	100	0	18.3 | Low	0	40+
BioNTech SE	39.5 | Medium	0	55+	36.1 | Average	100	0	25.9 | Medium	0	40+

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Appendix

Historical Morningstar Rating

Moderna Inc MRNA 30 Apr 2025 22:08, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	—	—	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★	★	★	★	★	★	★	★★	★★	—	—	—
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
—	—	—	—	—	—	—	—	—	—	—	—

Johnson & Johnson JNJ 30 Apr 2025 21:45, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	—	—	★★★★	★★★	★★★	★★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
★★★★	★★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★
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Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
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Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, indepth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss shortterm market-price movements), but we believe these negatives are mitigated by deep analysis and our longterm approach.

Morningstar's equity research group ("we," "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our singlepoint star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

When considering a company's moat, we also assess whether there is a substantial threat of value destruction, stemming from risks related to ESG, industry disruption, financial health, or other idiosyncratic issues. In this context, a risk is considered potentially value destructive if its occurrence would eliminate a firm's economic profit on a cumulative or midcycle basis. If we deem the probability of occurrence sufficiently high, we would not characterize the company as possessing an economic moat.

2. Estimated Fair Value

Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in workingcapital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total present value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty Around That Fair Value Estimate

Morningstar's Uncertainty Rating is designed to capture the range of potential outcomes for a company's intrinsic value. This rating is used to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating is aimed at identifying the confidence we should have in assigning a fair value estimate for a given stock.

Our Uncertainty Rating is meant to take into account anything that can increase the potential dispersion of future outcomes for the intrinsic value of a company, and any-

Morningstar Equity Research Star Rating Methodology

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thing that can affect our ability to accurately predict these outcomes. The rating begins with a suggested rating produced by a quantitative process based on the trailing 12-month standard deviation of daily stock returns. An analyst overlay is then applied, with analysts using the suggested rating, historical rating data, and their own knowledge of the company to inform them as they make the final Uncertainty Rating decision. Ultimately, the rating decision rests with the analyst. Analysts take into account many characteristics when making their final decision, including cyclical factors, operational and financial factors such as leverage, company-specific events, ESG risks, and anything else that might increase the potential dispersion of future outcomes and our ability to estimate those outcomes.

Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the potential dispersion of outcomes, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the Uncertainty Rating provides guidance in portfolio construction based on risk tolerance.

Our Uncertainty Ratings are: Low, Medium, High, Very High, and Extreme.

	Margin of Safety	
Qualitative Analysis Uncertainty Ratings	★★★★★Rating	★Rating
Low	20% Discount	25% Premium
Medium	30% Discount	35% Premium
High	40% Discount	55% Premium
Very High	50% Discount	75% Premium
Extreme	75% Discount	300% Premium

Our uncertainty rating is based on the interquartile range, or the middle 50% of potential outcomes, covering the 25th percentile–75th percentile. This means that when a stock hits 5 stars, we expect there is a 75% chance that the intrinsic value of that stock lies above the current market price. Similarly, when a stock hits 1 star, we expect there is a 75% chance that the intrinsic value of that stock lies below the current market price.

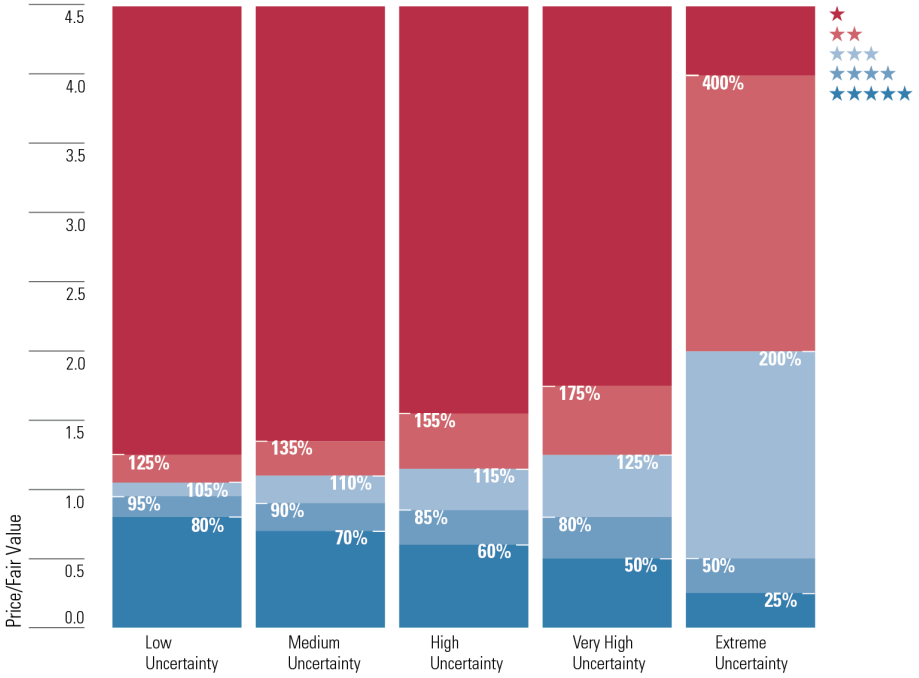
4. Market Price

The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more details about our methodology, please go to https://shareholders.morningstar.com

Morningstar Star Rating for Stocks

Morningstar Equity Research Star Rating Methodology



Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

The Morningstar Star Ratings for stocks are defined below:

★★★★★ We believe appreciation beyond a fair risk adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

★★★★ We believe appreciation beyond a fair risk-adjusted return is likely.

★★★ Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

★★ We believe investors are likely to receive a less than fair risk-adjusted return.

★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider compan-

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ies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

Sustainalytics ESG Risk Rating Assessment: The ESG Risk Rating Assessment is provided by Sustainalytics; a Morningstar company.

Sustainalytics' ESG Risk Ratings measure the degree to which company's economic value at risk is driven by environment, social and governance (ESG) factors.

Sustainalytics analyzes over 1,300 data points to assess a company's exposure to and management of ESG risks. In other words, ESG Risk Ratings measures a company's unmanaged ESG Risks represented as a quantitative score. Unmanaged Risk is measured on an open-ended scale starting at zero (no risk) with lower scores representing less unmanaged risk and, for 95% of cases, the unmanaged ESG Risk score is below 50.

Based on their quantitative scores, companies are grouped into one of five Risk Categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged ESG risk across all subindustries covered.

The ESG Risk Rating Assessment is a visual representation of Sustainalytics ESG Risk Categories on a 1 to 5 scale. Companies with Negligible Risk = 5 Globes, Low Risk = 4, Medium Risk = 3 Globes, High Risk = 2 Globes, Severe Risk = 1 Globe. For more information, please visit sustainalytics.com/esg-ratings/

Ratings should not be used as the sole basis in evaluating a company or security. Ratings involve unknown risks and uncertainties which may cause our expectations not to occur or to differ significantly from what was expected and should not be considered an offer or solicitation to buy or sell a security.

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