

A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics.

Waste Evolution in North America: Waste Management,  
Inc. Valuation

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A Project carried out on the Master in Finance Program, under the supervision of:

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## Abstract

This Equity Research aims to provide prospective investors with a comprehensive valuation of Waste Management, Inc., offering a well-founded recommendation on its intrinsic value and a suggested target share price. Employing various valuation methodologies, we conduct a thorough analysis, incorporating both historical financial data and qualitative insights pertaining to the company, its industry, and peer landscape. Within this individual report are the final sections of the report, outlining WM's key drivers and forecasts, valuation analysis and a final recommendation for investors.

## Keywords (up to four)

Waste Management, Residential and Industrial Footprint, Recession-proof, Environmental Sustainability

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This report is part of the Waste Management, Inc. Equity Research report (annexed), developed by João Canatário and Tomás Graça, and should be read as an integral part of it.

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# Introduction

The joint Equity Research report on Waste Management, Inc. aims to conduct an equity valuation, offering a recommendation to potential investors. Through a comprehensive analysis of the business, its industry, and competitors, we assess three scenarios for future performance using the Discounted Cash Flow method. Our conclusion recommends selling Waste Management's stock, given our projected target share price of \$151,77 for FY2025, indicating a -8,7% return from the current stock price of \$166,26, as of December 15th, 2023.

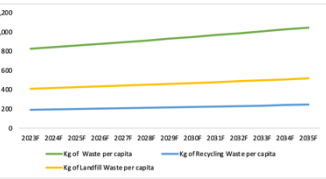
This individual report serves as the latter part of a comprehensive analysis, complementing the initial sections to provide a thorough understanding of Waste Management, Inc. The focus lies on critical aspects forecasting the income statement and balance sheet, employing valuation methodologies such as the DCF model and multiples analysis. Additionally, it encompasses both sensitivity and scenario analysis to gauge potential trajectories. The investment thesis and final recommendations serve as the culmination, weaving together the insights gained to offer a well-rounded evaluation and guidance for prospective investors.

The additional sections that are included in the joint report in annex, and in my colleague's individual report comprise the company overview, Waste Management's history, providing a snapshot of its current main information and position, describing its business model, conducting a financial analysis, and a reflection on both the share performance and management team. Lastly, it will display an industry overview, which contains an analysis on the industry and introduction of the company's main competitors.

# Main Drivers & Forecast

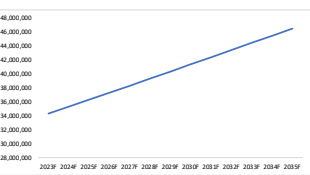
## Income Statement Forecast

**Figure 15 – Waste Production per capita 2023-2035**



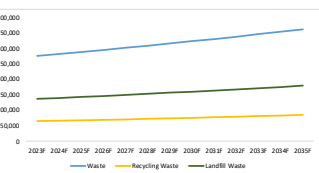
Source: Global Waste Index and World Bank

**Figure 16 – US population growth forecast 2023-2035**



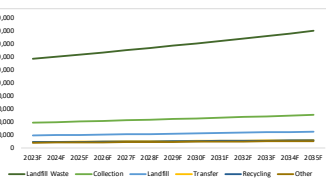
Source: World Bank

**Figure 17 – Annual Waste production forecast 2023-2035**



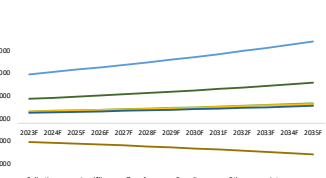
Source: Calculations

**Figure 18 – WM Forecasted Volume (millions of Kgs) 2023-2035**



Source: Calculations

**Figure 19 – WM Forecasted Revenue Breakdown 2023-2035**



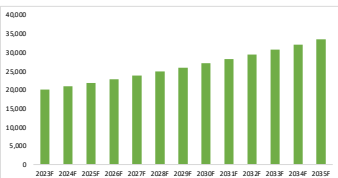
Source: Calculations

In order to estimate WM's value at the valuation date (December 31st, 2024), we started by forecasting the company's Income Statement. Despite the valuation date being December 31st, 2024, we decided to forecast the items for 2023, since we only had full-year information until 2022, and hence have a forecasting period from 2023-2035.

First things first, we started by estimating the company's revenues for the upcoming period. Not having clear information about volume or price point, we figured that the best way to estimate future revenues was to try to estimate future waste production. From the Global Waste Index 2022 we found that in the U.S., in 2022, each person produced, on average, 811kg of waste, recycling 190kg. Landfill waste per capita, on the other hand, was 402kg. From a World Bank study on waste management, we extracted an annual growth of 1,98% of waste produced per capita, which we applied to these three items, allowing us to forecast Kg of Waste, Recycling Waste, and Landfill Waste per capita (Figure 15). Through World Bank and Congressional Budgeting Office of the U.S. studies we found the U.S. population growth (Figure 16), which then allowed us to have an estimation of annual production of waste, recycling waste, and landfill waste (Figure 17). Trying to be a little more conservative in our estimations after forecasting linear growth in waste production, we decided to assume that WM's market share of 14,1% in 2022 would remain constant until 2035. Having forecasted the volume for the collection, landfill and recycling operations, we still needed to forecast transfer, other, and intercompany volume (Figure 18). Because transfer stations are a pit stop in the transport of waste to landfills, we decided to forecast it as a percentage of landfill volume, based on the average of the previous four years (2018-2022). Not being able to find a direct relationship between other and intercompany revenue sources with the other ones, we forecasted their volume as a percentage of the collection, landfill, recycling and transfer volume, once again assuming the average of the previous four years. Dividing 2022's total revenue by the total volume in that year, we understood that the average price point was \$0,27/Kg of waste, which we assumed would grow in line with inflation. After calculating the future revenue for each business line, we did not believe that our estimation for the intercompany item was reasonable compared to historical data and all the business expansion assumptions, so we decided to assume that intercompany's revenue would simply be forecasted as a percentage of collection, landfill, transfer and recycling revenue (Figure 19). It is important to note that, even though the U.S. represents approximately 96% of the company's revenue, we must account for the remaining 4% of the business which take place in Canada. As such, keeping in mind that Canada's weight is not very representative, we thought that the best strategy would be to assume that this geographical split would continue, and adjust each business line revenue accordingly (i.e., divide by 0,96) (Figure 20). All of this process led to a 2% total revenue annual growth in 2023, followed by a 5%-increase in 2024, but then finding its steady-state at a 4% annual growth rate from 2024 onwards, which despite being reasonably above predicted inflation (4,5% in 2023 and around 2% until 2035) does not seem unrealistic given the increasing importance of the waste management business in circular economy and environmental matters.

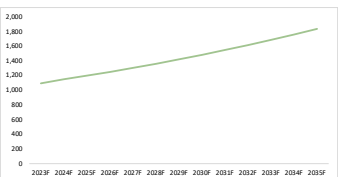
Having forecasted the most important item in the Income Statement, it was time to predict the result of the core, non-core and financing business of the company. For the core business, we

**Figure 20 – WM Total Revenue 2023-2035**



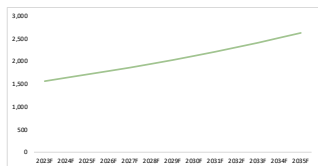
Source: Calculations

**Figure 21 – Forecasted Core Result, 2023-2035**



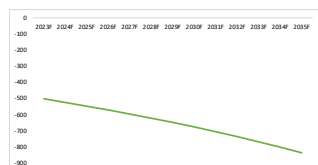
Source: Calculations

**Figure 22 – Forecasted Non Core Result, 2023-2035**



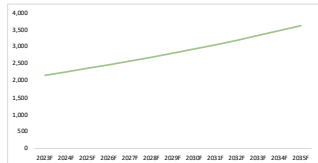
Source: Calculations

**Figure 23 – Forecasted Financing Result, 2023-2035**



Source: Calculations

**Figure 24 – Forecasted Comprehensive Income, 2023-2035**



Source: Calculations

assumed that all core costs and expenses would grow as a percentage of total revenue (using the average percentage of the previous four years), as they all are dependent on volume – such as Labor and related benefits, Transfer and disposal costs, Maintenance and repairs, among other. Other core costs were also assumed to grow in line with total revenue, except for Provision for bad debts, that was predicted to grow in line with Accounts Receivable given its nature, and Depreciation, depletion and amortization that are expected to evolve according to Property and equipment. After taxes and adjustments, we got to a core result (Figure 21) that would grow 7% in 2023 compared with the previous year, 5% in 2024, and then finding its steady-state growth rate of 4% per year from 2025 onwards.

For the non-core business, the only revenue source was the “other” business line, to which we subtract all the costs that were estimated assuming that its percentage of total revenue would remain the same as the average of the previous four years. After all the relevant considerations, we arrived at a non-core result (Figure 22) that in 2023 would have increased 5% compared with 2022, 5% in 2024, and then reaching a steady-state growth rate of 4% per year from 2025 onwards.

Lastly, the most representative items in WM's financing business were naturally forecasted assuming that the previous four-year average of its percentage of long-term debt would remain the same – the case of Interest Expense and Loss on early extinguishment of debt – while Equity in net losses of unconsolidated entities was forecasted assuming that the average of the previous years' percentage of Investments in Unconsolidated Entities would remain the same. The financing business result (Figure 23) in 2023 was predicted to have grown 41% in 2023 compared to 2022, 5% in 2024, and achieving a steady-state growth rate of 4% per year in 2025.

Adding together the core, non-core, and financing perspectives of WM's operations, we got to a total comprehensive income in 2023 that would have represented a 0% increase when compared with 2022, 5% in 2024, and a steady-state annual growth rate of 4% per year from 2025 onwards.

All things considered, WM's estimated total comprehensive income (Figure 24) grows in line with the evolution of revenue, suggesting that the profit margins will be practically the same. As we are unable to predict the future advances in technology, as well as the intended mergers and acquisition plan of the company and its effect on the operations, a forecast that suggests that profit margins will stay the same seems conservative, but reasonable for a neutral analysis of a business that will definitely become more and more relevant in the future.

## Balance Sheet Forecast

Having completed the analysis of WM's forecasted income statement, we must dig deeper in order to get to the valuation. Therefore, we also forecasted the company's Balance Sheet. As previously explained, we chose to anticipate the items for 2023 despite the value date being December 31, 2024, given we only have full-year information up until 2022 and have a forecasting period from 2023 to 2035.

To begin, we will take look at the company's core business assets, liabilities, and the invested capital on core business. Screening through WM's core assets, we can start by explaining its working cash, where we assumed that it will be 2% of total revenue, in line with happened in the past 4 years. As for Accounts Receivable, we computed the average of WM's average collection period from 2018 to 2022 and assumed that from 2023 on, that value would remain constant and as such, the company's Accounts Receivable would be the multiplication of that Average

Collection Period and WM's revenues divided by the 365 days. Other receivables were computed as a percentage of accounts receivable. The next core assets we will take a look at are Parts and Supplies and Other Assets, where, in both cases we assumed that these goods would grow at a fixed percentage of revenues, the average of the period 2018-2022. Looking now at the company's Property, Plant and Equipment (PP&E), we computed the average PP&E as percentage of revenue for the 2018-2022 period and decided that it was fair and justifiable to maintain this average, 83% of revenues, as the total PP&E until 2035, i.e, it will grow proportionally as revenues increase. Goodwill, which is the excess of the purchase cost over the fair value of the net assets of the company acquired by WM, is not amortized, but is assessed for impairment each year. Having studied WM's acquisition history, we concluded that WM's acquisition strategy is based on the acquisition of other players within the industry, and they have been doing so on a constant basis over the past years. That being said, the forecasted goodwill assumes that for every four years there will be an acquisition made by WM, with the following years coming as adjustments to the deal. In this way, Goodwill will increase at 2% when there is no acquisition in that year and will grow at 10% assuming an acquisition has been made that year. Since it was hard to predict future business decisions, we thought that a safe and explainable approach would be to continue WM's past acquisition activity.

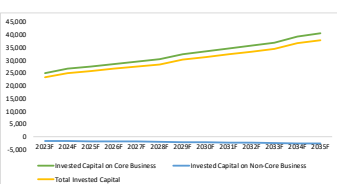
On the other hand, Other Intangible Assets consist primarily of customer and supplier relationships, covenants not-to-compete, licenses, permits and other contracts. These items are recorded at fair value on the acquisition date and are generally amortized using either a 150% declining balance approach or a straight-line basis as we determine appropriate. Our reasoning for the forecast of this item, given of what it consists of, was that with time, it is likely that it would increase to higher levels given the increase in WM's volume and value as a company. Having said that, we stated that this item would grow at the same pace as Goodwill, since WM's specific other intangibles would be more likely to increase as WM's acquisition performance increases. As for Restricted Funds, the reasoning was the same and an average of 2% of revenues was accepted as a terminal value until the end of the forecast.

Looking now at WM's core liabilities, we will first explain the evolution of Accounts Payable. We calculated the average of WM's average payable period from 2018 to 2022 and noticed that this period was increasing in every year. As such, we decided to use the 2022 value as a final value and assume that Accounts Payable until 2035 would be computed as the product of that Average Payable Period time and WM's forecasted costs and expenses divided by the 365 days. Analyzing the accrued liabilities, we assumed that its average as percentage of revenues during the period 2018-2022 would be kept and as such, 8% of revenues. As for deferred revenues, we assumed it will proportionally follow the increase in revenues, at around 3% of revenues. Last but not least is the Landfill and Environmental remediation, one of the biggest liabilities associated with WM's core operation. We assumed it would grow at a constant percentage of revenues.

We decided to maintain the average for the 2018-2022 until the end of the forecast. Having taken into consideration both WM's core assets and liabilities, we can conclude on the Invested Capital on Core Business (Figure 25). Our assumptions and forecasts result in an 8% increase in Core Invested Capital in 2023, 7% in 2024, and reaching a steady growth value of 3% until the end of the forecast, except for the years when Goodwill is at 10%.

We will now look at the non-core side of the business, which incorporates Investments in unconsolidated entities and Other assets. Investments in Unconsolidated Entities and Other Assets will evolve at 3% and at 5% of revenues until the end of the forecast period, respectively.

**Figure 25 – Forecasted Total Invested Capital breakdown, 2023-2035**

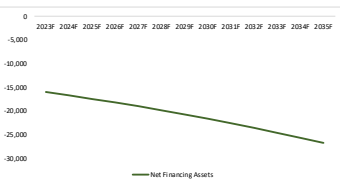


Source: Calculations

Having explained WM's non-core assets, it is time to focus on the non-core liabilities. The first, deferred income taxes, was predicted to grow in the future as a fixed percentage of non-core assets, at 131%, a value that will be used until 2035. The second, other liabilities, is expected to grow as a percentage of total revenue. The same reasoning used often throughout this forecast was again established, using the previous 5-year average, at 6% of total revenues. According to our projections and underlying assumptions, Non-Core Invested Capital (Figure 25) will rise by 29% in 2023, 5% in 2024, and then remain stable at 4% during the remainder of the period. As for the Total Invested Capital (Figure 25), based on our projections, in 2023 it will increase 7%, 7% in 2024, and afterwards it will remain stable at 3% a year until the end of the projection, except for the years when Goodwill is at 10%.

In order to finish WM's balance sheet forecast is essential to analyze the Financing Business (Figure 26). The first item that comes into our attention is the Excess of Cash. The fact that from 2018 to 2022 there have been gigantic year-on-year percentage changes, mainly in 2019 and in 2021, allowed us to realize this dispersion and enabled us to come to a consent regarding this topic. As such, we computed the average year-on-year percentage change on working cash during this period and assumed that that value would remain constant and that from 2023 onwards, the excess of cash would grow at that rate. As for the Long-term debt, less current portion, we assumed that it would evolve as a percentage of total revenue, for which we assumed that the average of the previous years would remain the same.

**Figure 26 – Forecasted WM's financing business, 2023-2035**



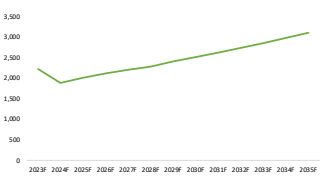
Source: Calculations

## Valuation

### DCF Model

The Discounted Cash-Flow (DCF) approach was the initial method of valuation utilized to determine WM stock price. A Free Cash-Flow map (Figure 27) with WM's FCF up to 2035 was created using the financial projections from the report's preceding chapter as a guide. The FCF had to be discounted with the WACC (post-tax) after that. The WACC computation will be explained next and includes the following variables: D/V target; Cost of Equity; Cost of Debt. All in all, this resulted in a WACC of 7,12%. After discounting the FCF until 2035, we had to compute the Terminal Value so that the Enterprise Value could be computed. As such, a perpetuity was calculated using the FCF from the year 2035, where we believe the company will reach its growth steady state, using the 7,12% WACC and the growth rate of 2035, equal to 3,7%, was assumed to be steady for eternity. After discounting this perpetuity to the valuation date, December 31st, 2024, we got to the discounted terminal value. Adding this to the sum of the discounted FCF, we got the Enterprise Value of \$75Bn. To reach the Equity Value we had to subtract WM's Net Debt which is computed summing the LT debt and the ST debt and subtracting the excess of cash. This resulted in an Equity Value of \$61Bn, and consequently resulted in a share price of \$151,77 (Table 2). Considering this valuation result, the stock is currently overvalued (as its value on the reference date of November 2nd, 2023 is \$166,26) and the investors are recommended sell this stock.

**Figure 27 – Forecasted WM's unlevered FCF, 2023-2035**



Source: Calculations

**Table 2 – WM Enterprise and Terminal Value**

Discounted FCF	14,443
Discounted Terminal Value	61,740
Enterprise Value	75,033
Net Debt	13,887
Equity Value	61,131
# Shares Outstanding	403
Share Price	151.77
Actual Price	166.26
Final Recommendation	Short

Source: Calculations

We also conducted varied sensitivity and scenario analysis by changing the main valuation assumptions, which we will later approach and insight in this report. This analysis resulted in a pessimistic scenario of \$110,88 (if scenario 1 is the reality) and an optimistic one of \$198,25, (if scenario 3 is the reality). This means that in the case of the pessimistic scenario, the company

stock would be overvalued, and it would be undervalued in the optimistic scenario.

## Cost of Capital

To discount both core and non-core cashflows of Waste Management, we used the Weighted Average Cost of Capital (WACC), which plays a crucial role in valuations due to its strong influence on the present value of the company's future cashflows. It is calculated through the formula  $r_{WACC} = r_E * E/(E+D) + r_D * D/(E+D)*(1-t)$ , meaning that the WACC ( $r_{WACC}$ ) is the sum of the proportion of the company's equity multiplied by the cost of equity and the proportion of its debt multiplied by the after tax cost of debt.

These values can be observed in Table 3. To calculate the cost of equity, we used the Capital Asset Pricing Model (or CAPM), illustrated as  $r_{WM} = r_f + \beta_{WM} * (r_M - r_f)$ . For the risk-free rate ( $r_f$ ), we considered the U.S. 10-year treasury yield, not only because it is widely regarded as the safest financial instrument available, being highly liquid and backed by the United States' Government, but also because WM is an American company, which makes it the best proxy for the risk-free rate. According to Bloomberg, the U.S. 10-year Treasury Yield was 4,31%. The market risk premium ( $r_M - r_f$ ), on the other hand, was based on Aswath Damodaran model's recommendation of the equity risk premium for 2023, that was 4,40%. Moreover, we assumed that the tax rate was fixed at 21% for the whole industry, which corresponds to the statutory federal tax rate. At this point, we are only missing WM's re-levered beta ( $\beta_{WM}$ ). To obtain that, as well as its peers' levered betas, we regressed five years of daily returns against the market's portfolio – the S&P500 – given that it is the benchmark for determining the state and performance of the U.S. economy, once it combines a broad scope of the biggest companies from different sectors, with a significant degree of liquidity. The next step was to unlever the obtained levered equity betas, as these were adjusted to the past capital structures, and by taking its average, we obtained the industry unlevered beta. Lastly, we re-leveraged the industry's unlevered beta using WM's market D/E of 17%, reaching a re-levered beta of 0,752. Finally, we reached a cost of equity of 7,6%. For the cost of debt, we used the average of two different methods. In the first one, we estimated the yield to maturity of WM's 10-year Senior Unsecured Corporate Bond, which according to Bloomberg on it was 5,29%. This approach delivered a cost of debt of 5,29%, after adjusting for the probability of default of 0,05% (based on Moody's Ratings) and a 49,42% Loss Given Default, through the formula  $r_D = y_{WM} - Prob(default) * Loss Given Default$ . The second approach, however, defined the cost of debt as WM's credit spread, adding to the risk-free rate of 4,31% the spread of a 10-year credit default swap of WM – 0,98%, reaching a value of 5,3%. The final value for the cost of debt (the average of the two approaches) was then 5,28%. For debt-to-value and equity- to-value ratios, we used the market value of debt, based on the amount outstanding of all the corporate bonds issued, as well as the market value of equity, using the number of shares outstanding and traded share price. Plugging these into the WACC equation, we get to a cost of 7,12%.

**Table 3 – WACC elements**

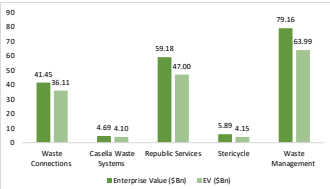
Return on Equity	7.62%
Risk-Free Rate (U.S. 10-year Treasury Yield)	4.31%
Beta Equity	0.73
Market Risk Premium	4.40%
Return on Debt	5.28%
Return on Debt (1st Approach)	5.29%
Return on Debt (2nd Approach)	5.29%
E/(E+D)	85.48%
D/(E+D)	14.52%
Tax Rate	21%
WACC	7.12%

Source: Calculations, Bloomberg, Damodaran's Model

## Multiples Analysis

Because the DCF Model alone does not provide an analysis of the big picture, as it is only an intrinsic valuation method, it is always useful to complement that model with extrinsic valuation models, such as the multiples analysis. Furthermore, being able to compare WM with its peers is extremely insightful, as it allows us to understand if it is well positioned within the industry, and whether it stands above or below its competitors. Additionally, valuing a company based on comparables reflects current prevailing market conditions.

**Figure 28 – Comparable companies' Market Cap & EV**



Source: Bloomberg

As such, we compared WM with a group of peers described before (Waste Connections, Casella Waste Systems, Republic Services and Stericycle). It is worth pointing out that the peer group chosen market cap ranges from \$4Bn - \$64Bn, with Casella Waste Systems having the lowest value of \$4,1Bn, and Waste Management having the greatest value of \$63,9Bn (Figure 28). When it comes to Enterprise Value, these companies range from \$5Bn - \$80Bn, with Casella Waste Systems having the lowest value of \$4,7Bn, and Waste Management having the greatest value of \$79,2Bn (Figure 28).

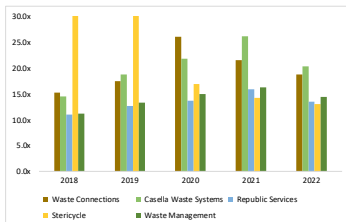
This group of comparable companies was assessed based on an Enterprise Value multiple – EV/EBITDA –, and a widely used metric – P/E ratio. While the first is frequently used as it is independent of capital structure and shows a company's ability to generate cash from its operations, the last one is commonly used by investors to understand relative stock valuation and determine whether it is over or undervalued.

Starting with the EV/EBITDA multiple (Figure 29), in 2022, WM comes in fourth place with a multiple of 17,6x, behind Republic Services' 18,6x, Casella Waste System's 21,1x and Waste Connection's 23,4x. In this 5-year window, it is curious to understand that WM's EV/EBITDA multiple is consistently in the middle to lower end of the range and below-average. Such position suggests that WM's Enterprise Value might be underestimated, despite leading the EV ranking with \$79,2Bn as seen before. Alternatively, and more realistically, it might be the case that WM's EBITDA might be either in line with its EV size, or disproportionately big for it when compared to peers. Such conclusion confirms the hypothesis that WM's EV has been underestimated given its profitability metrics, when compared with competitors.

When it comes to the P/E ratio (Figure 30), the analysis is similar. In 2022, WM displayed the lowest ratio of 28,6x, while the greatest ratios were of Casella Waste Systems (77,2x) and Stericycle (73,5x), while in the previous five years it was always below average and in the lower end of the range. Such consistency suggests two hypotheses: 1) WM's stock price has been undervalued for a long time, which seems difficult as the Efficient Market Hypothesis would argue that being inaccurately priced, rational investors would eventually exploit this excess profits and correct this inaccuracy, or 2) WM's earnings per share are way too big which is easily observed by Figure 31.

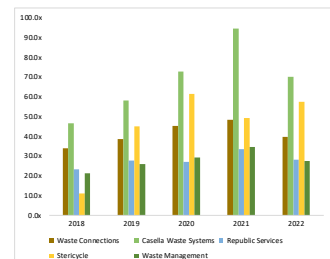
Estimating WM's share price using the three difference metrics (Table 4) – now including the EV/Revenue multiple –, we understand that the common result is an average price that is above the one calculated with the DCF Model. The EV/EBITDA multiple suggest an average share price of \$204, which represents a 35% overestimation compared with the DCF Model's price. This overestimation tendency remains considering the estimations of the P/E ratio and the EV/Revenue multiple, which value the stock at \$235 and \$207, respectively, representing 55% and 37% differences, respectively. These three overestimations seem fair when we consider the

**Figure 29 – Comparable companies' EV/EBITDA Multiple, 2018-2022**



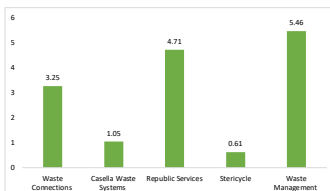
Source: Bloomberg

**Figure 30 – Comparable companies' P/E Ratio, 2018-2022**



Source: Bloomberg

**Figure 31 – Comparable companies' EPS, 2022**



Source: Bloomberg

**Table 4 – Share price estimation with Multiples**

	Min	Q1	Q2	Q3	Max
EV/EBITDA	41	193	204	232	257
P/E	155	171	235	400	420
EV/Revenues	104	193	207	210	276

Source: Calculations

fact that the EV range suggested by these multiples considered the multiples of WM and its peers in 2023, multiples in which WM consistently underperformed the group. Therefore, it should not come as a surprise the fact that this relative valuation overestimates WM's stock (having as reference the DCF valuation) and that the DCF stock price comes closer to the Q1 price point most of the times.

It is still interesting to use both the EV/EBITDA and P/E multiples through the cycle (Table 5), i.e., not considering only the values of 2023, but rather the multiples since 2018. As such, the EV/EBITDA through the cycle multiple estimates an average price of \$175 for WM, which is only 15% above the DCF valuation. The P/E through the cycle multiple, on the other hand, indicates an average stock price of \$210, a 38% overestimation.

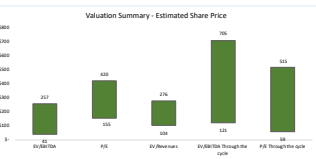
To conclude, this relative valuation (Figure 32), although very insightful, consistently overestimates the reference WM stock price provided by the DCF valuation, with an average EV/EBITDA multiple of 16,9x in 2023 and an average P/E multiple of 47,2x in 2023. When historical data is included in the valuation the estimations seem more reasonable, suggesting that the 2023 multiples alone really overestimate the average stock price, which could have been expected since in 2023 WM's multiples consistently underperformed its peers.

**Table 5 – Share price estimation with through the cycle Multiples**

	Min	Q1	Q2	Q3	Max
EV/EBITDA Through the cycle	121	150	175	223	705
P/E Through the cycle	59	150	210	268	515

Source: Calculations

**Figure 32 – Football Field Chart**



Source: Calculations

## Sensitivity Analysis

Sensitivity analysis is an essential tool in the complex world of corporate valuation, providing a nuanced knowledge of a company's financial dynamics and the potential effects of changing key factors. This methodology is especially important for the thorough assessment of WM since it clarifies the complex relationships between the company's financial structure and market value. Sensitivity analysis is the process of systematically changing important input parameters in financial models to determine how it affects the output metrics, such as stock price or firm valuation. The main goal is to determine how sensitive these measures are to changes in underlying premises. Two different sensitivity assessments for the valuation WM were carried out.

The first sensitivity analysis delved into WM's WACC, where, by manipulating the return on debt and levered cost of equity (Table 6), the analysis explored the resilience of WM's accrued financial value to fluctuations in these fundamental components. This process is pivotal in understanding how changes in the cost of debt and the return expected by equity investors impact the company's discount factor, i.e, its WACC. Such insights are invaluable for decision-makers, providing a nuanced perspective on the potential ramifications of alterations in financial leverage. In this specific case, it can be easily seen in Table 6 that the lower the return on debt and the lower the levered cost of equity, the lower will WM's WACC be.

The WACC and the growth rate of core results were the subjects of the second sensitivity study (Table 7). The investigation examined the effects on the company's stock price by changing these parameters.

The WACC, which includes the cost of debt and equity, is crucial in calculating the present value of future cash flows, and changes to this parameter can have a significant impact on valuation results. Simultaneously, the growth rate of core results reflects the company's potential for expansion and profitability, directly impacting its stock price. By scrutinizing the sensitivity of these variables, the analysis equips stakeholders with a profound comprehension of how market

**Table 6 – WACC Sensitivity**

WACC	Return on Debt (%)									
	0.00%	0.25%	0.50%	0.75%	1.00%	1.25%	1.50%	1.75%	2.00%	2.25%
0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%
1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%
1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%
2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%

Source: Calculations

**Table 7 – Share Price Sensitivity**

Share Price	Growth Rate (%)									
	0.00%	0.25%	0.50%	0.75%	1.00%	1.25%	1.50%	1.75%	2.00%	2.25%
0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%
1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%
1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%
2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%

Source: Calculations

valuation responds to changes in these parameters. In this case, as visualized in Table 6, the higher the growth rate of core results and the lower the WACC, the higher the company's projected stock price will be.

In order to reduce the inherent uncertainties in financial forecasts and firm valuation, sensitivity analysis is essential. Sensitivity studies serve as a risk management tool in the dynamic environment of WM, where market circumstances, interest rates, and growth prospects change. They give analysts and decision-makers the ability to foresee a wide variety of possible outcomes, determine the impact of unstable market conditions, and strengthen strategic decision-making.

## Scenario Analysis

Scenario analysis is crucial for to evaluate the potential trajectories of a corporation in the complex dance of corporate valuation. It uncovers dynamic interactions between factors impacting the company's future value. The analysis explores three key dimensions, each driven by specific assumptions, revealing probable variability in key variables.

In the first scenario, the variable under the microscope is population growth (Table 8). The base case assumes a steady growth of 0,3% annually from 2023 to 2035. The bear case presents a more conservative narrative, with a growth rate of 0,1%, while the bull case envisions an ambitious 0,5% annual growth. The intrinsic connection between population growth and the demand for waste management services is evident. As the population swells, so does the demand for waste management solutions, directly impacting revenues and, subsequently, the overall company value.

The development of WM's market share is the scope of the second scenario (Table 9). In the base case, it is assumed that the company's market share will be steady at 14,07% until 2035. The bear scenario assumes the market share to be 12,66%, whilst the bull case predicts an upbeat increase to 15,48%. This hypothetical situation tests WM's adaption and resilience to potential changes in market dynamics. A changing market share can have a significant impact on sales, which has repercussions for how much a company is worth.

The third scenario explores how average sales prices change over time, recognizing the mutually beneficial relationship between pricing dynamics and business performance (Table 10). The bear and bull cases consider variations that investigate the resilience of WM's income streams under various pricing situations. Increased average sales prices, which are driven by elements like market share and population expansion, invariably result in higher revenues and, as a result, an increased firm value.

All in all, our approach for the scenario analysis aimed to create three possible scenarios, where in each we would change the three variables explained above. On the base case, every variable is assumed to be on the base case, on the bear case each variable is assumed to be on the bear case, and the same for the bull scenario.

The numbers give our story a quantitative element. The estimated stock price in the bear scenario, when care is advised, is \$109,03, meaning that WM's stock would be overvalued. A trajectory of stability and continuity, or the base scenario, predicts a stock price of \$149,36. The optimistic bull case predicts that the stock price will rise to \$195,18, meaning that the stock would be undervalued. These numbers capture the concrete results of our scenario analysis, providing

**Table 8 – Population growth rate**

	Population growth per region	233
Bear Case	USA	0.10%
Base Case	USA	0.30%
Bull Case	USA	0.50%

Source: Calculations and World Bank

**Table 9 – WM's Market Share**

	Market Share	229
Bear Case		12.66%
Base Case		14.07%
Bull Case		15.48%

Source: Calculations

**Table 10 – Average Sales Prices**

	Average Sales Price	228
Bear Case	USA	0.25
Base Case	USA	0.35
Bull Case	USA	0.53

Source: Calculations

decision-makers with specific information about the possible valuation paths that WM could take.

## **Investment Thesis & Final Recommendations**

We issue a Sell recommendation on Waste Management, Inc. Our price target for the valuation date of December 31st, 2024 is \$151,77, which implies a total annualized shareholder return of -8,71%, when compared to the actual stock price of \$166,26 on the reference date of November 2nd, 2023.

Nevertheless, we believe do WM will consolidate and further enhance its leading position in the waste management industry in the United States, capitalizing from the continuous and promising growth of this service in a world each time more focused on sustainability and circularity of the economy. Moreover, the company's performance has proven the resilience of its business model against economic downturns like the COVID-19 pandemic.

We consider that the key strategy for WM is to keep on positioning itself and its operations in a geographically efficient manner, leveraging from its dominant asset network of landfills and transfer stations, as well as remaining a leader in the recycling and renewable energy spaces with technological evolutions in recycling processing and landfill gas-to energy plants. Furthermore, WM must remain its balance sheet strong and liquid as it has been doing so far, but without forgetting that, compared to its industry peers, it is over leveraged, given the significantly higher D/E ratio. Lastly, it should keep investing in its culture of continuous improvement and innovation, led by an experienced management team, and in deepening its knowledge on environmental solutions and regulatory matters. Such efforts would allow the company to maintain and increase its market share, in an industry that promises sustainable growth.

Nevertheless, there are some risks that may threaten WM's success and for which it should pay attention to. Firstly, the current inflation levels that have been consistently increasing over the last two years and that naturally slow down production and consequently waste generation. Secondly, the 96% of the company's revenue come from the United States, which make it greatly exposed to the nation's economy performance and its particularities. Last but not least, this industry is characterized by constant regulatory changes, and it is important to be up to date in order to avoid any type of inappropriate behavior that may lead to negative externalities and fines.

Despite believing that WM has the capacity to grow in the future and protect its market leader position, and perhaps capturing more share of the market, our analysis suggests that the market is overconfident about WM and is hence overestimating its current value. As such, we would advise investors to sell sell the stock.

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# Appendix

# Financial Statements

Waste Management, Inc.												
Income Statement												
US\$ in Millions												
	2019A	2019A	2020A	2021A	2022A	2023F	2024F	2025F	2026F	2027F	2028F	2029F
<b>Total Revenues</b>	14,914	15,455	15,218	17,931	19,601	20,057	20,991	21,924	22,874	23,868	24,925	26,006
<b>Core Business:</b>												
Operating Revenues:	13,178	13,697	13,442	15,819	17,293	17,682	18,506	19,328	20,166	21,042	21,974	22,927
Commercial	3,912	4,229	4,103	4,760	5,460	6,003	6,597	6,990	7,189	7,501	7,824	8,179
Industrial	2,529	2,613	2,770	3,170	3,681	4,257	4,456	4,654	4,855	5,066	5,291	5,520
Residential	2,773	2,916	2,716	3,212	3,339	3,862	4,042	4,221	4,404	4,596	4,799	5,007
Other collection	450	462	463	515	529	508	546	584	622	662	702	742
Total collection	9,726	10,240	10,003	11,695	13,169	11,247	11,771	12,494	13,096	13,944	14,987	15,915
Landfill	3,560	3,846	3,687	4,153	4,600	5,575	5,834	6,094	6,358	6,624	6,928	7,228
Transfer	1,711	1,820	1,855	2,072	2,143	2,703	2,829	2,955	3,083	3,217	3,359	3,505
Recycling	1,293	1,040	1,127	1,681	1,701	2,635	2,758	2,880	3,005	3,136	3,274	3,416
Intercompany (b)	-3,110	-3,249	-3,260	-3,762	-4,300	-4,477	-4,686	-4,894	-5,106	-5,328	-5,564	-5,806
Costs and expenses:	9,249	9,496	9,341	11,111	12,284	12,404	12,982	13,559	14,146	14,761	15,415	16,083
Labor and related benefits	2,703	2,791	2,746	3,223	3,452	3,599	3,767	3,934	4,105	4,283	4,473	4,667
Transfer and disposal costs	1,895	1,815	1,815	1,161	1,215	1,405	1,470	1,535	1,602	1,672	1,746	1,821
Maintenance and repairs	1,255	1,355	1,331	1,596	1,835	1,771	1,853	1,936	2,020	2,107	2,201	2,296
Subcontractor costs	875	1,532	1,523	1,786	2,006	1,972	2,064	2,156	2,250	2,347	2,451	2,558
Cost of goods sold	783	553	553	936	973	907	950	992	1,035	1,080	1,128	1,177
Fuel	409	336	265	393	592	476	488	520	542	566	591	617
Disposal and franchise fees and taxes	598	627	606	698	720	796	823	859	897	935	977	1,019
Landfill operating costs	331	379	394	412	421	469	491	513	535	558	583	608
Risk management	235	267	269	344	345	311	368	384	401	418	436	455
Other	455	496	519	582	732	667	698	729	761	794	829	865
<b>Core Gross Profit</b>	3,929	4,201	4,101	4,798	4,999	5,278	5,524	5,770	6,020	6,281	6,560	6,844
Labor and related benefits	957	1,020	1,057	1,215	1,405	1,316	1,377	1,438	1,501	1,566	1,635	1,705
Professional fees	113	183	256	228	268	251	263	274	286	299	312	325
Provision for bad debts	53	38	54	37	50	66	69	73	76	79	82	86
Depreciation, depletion and amortization	1,477	1,574	1,671	1,999	2,038	2,113	2,212	2,310	2,410	2,515	2,626	2,740
<b>Core Result Before Taxes</b>	1,329	1,386	1,063	1,229	1,448	1,532	1,603	1,675	1,747	1,823	1,904	1,986
Statutory taxes	279	291	223	258	304	322	337	352	367	383	400	417
Core tax adjustments	105	92	84	97	111	119	124	130	136	141	148	154
<b>OCI:</b>												
Post-retirement benefit obligations, net	2	1	1	3	0	2	2	2	2	2	2	2
<b>Core Result</b>	947	1,004	756	877	1,023	1,093	1,144	1,195	1,247	1,301	1,358	1,417
<b>Non-Core Business:</b>												
Operating Revenues:												
Other (a)	1,736	1,758	1,776	2,112	2,405	2,375	2,485	2,596	2,708	2,826	2,951	3,079
Costs and expenses:												
Restructuring	4	9	8	3	3	1	1	1	1	1	1	1
(Gain) loss from divestitures, asset impairments and unusual items, net	58	42	15	-146	-488	63	16	69	71	75	78	82
Other	330	390	361	384	425	458	479	500	522	545	569	593
<b>Non-Core Result Before Taxes</b>	1,460	1,326	1,371	1,736	1,917	1,853	1,939	2,025	2,113	2,205	2,303	2,402
Statutory taxes	307	277	288	365	403	389	407	425	444	463	484	505
Non-core tax adjustments	-151	-101	-86	-59	-56	-113	-119	-124	-129	-135	-141	-147
Rounding adjustments	-1	0	1	0	0	0	0	0	0	0	0	0
<b>OCI:</b>												
Derivative instruments, net	8	8	15	9	8	9	9	9	9	9	9	9
Available-for-sale securities, net	5	15	11	6	-24	0	0	0	0	0	0	0
Foreign currency translation adjustments	-105	55	20	-28	-40	-25	-25	-25	-25	-25	-25	-25
<b>Non-Core Result</b>	1,211	1,221	1,405	1,405	1,485	1,561	1,635	1,708	1,783	1,861	1,944	2,029
<b>Financing:</b>												
Costs and expenses:												
Interest expense, net	-374	-411	-425	-365	-378	-480	-503	-525	-548	-571	-597	-623
Loss on early extinguishment of debt, net	0	-85	-53	-220	0	-86	-90	-94	-98	-102	-106	-111
Equity in net losses of unconsolidated entities	-41	-55	-68	-36	-67	-64	-67	-70	-73	-77	-80	-83
Other, net	2	50	5	5	21	-2	-2	-2	-2	-2	-2	-2
<b>Financing Result Before Taxes</b>	-413	-601	-541	-636	-447	-632	-662	-691	-721	-752	-785	-819
Statutory taxes	87	126	114	129	141	133	139	145	151	158	165	172
Minority interests	-2	0	0	1	2	2	2	2	2	2	2	2
<b>Financing Result</b>	-328	-475	-427	-506	-304	-502	-525	-548	-571	-596	-623	-649
<b>Total Comprehensive Income</b>	1,835	1,749	1,543	1,794	2,152	2,153	2,254	2,355	2,458	2,566	2,680	2,797

