

Resource Efficiency and Earnings Surprise

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Investors continue to debate whether environmental, social, and governance (ESG) factors can be used to identify companies that outperform the average. In this paper, we analyse the relationship between corporate sustainability practices and earnings surprise to investigate whether companies pursuing more environmentally friendly business models are more likely to report earnings that exceed market expectations. If it can be shown that sustainability contributes to beating estimates, it would provide an important link between corporate environmental impact and stock price performance and therefore justify the use of sustainability as a component in the investment process.

Investors have long understood the dynamic between corporate financial performance and market expectations as a driver of equity returns. Market values rise or fall not necessarily because a company reports good or bad numbers but rather when those results exceed or lag market expectations.

The global equity markets are highly efficient, however, and share prices discount future expectations rapidly. Beating market expectations on a consistent basis should be an anomaly for any given company and can only occur if investors somehow fundamentally misunderstand its competitive position. This misunderstanding results in forecasts that underestimate the true earnings power of the business and if it persists over time, the company will consistently “surprise” the market.

Beating market expectations consistently therefore is evidence that a company possesses a competitive advantage which is fundamentally underappreciated by the market. This paper examines whether sustainable companies are creating such an advantage by assessing the relationship between corporate environmental impact and earnings surprise.

Measuring Sustainability

At Osmosis, a company’s sustainability practices are measured by assessing its Resource Efficiency. We define Resource Efficiency as the annual carbon emitted, water used, and waste generated during regular company operations. We divide each of these metrics by revenue to compute an intensity ratio, and then combine the intensities into an overall Resource Efficiency score, known as MoRE (Model of Resource Efficiency).

We scale by revenue for both practical and philosophical reasons. On the practical side, dividing by revenue automatically adjusts for company size. Larger companies naturally use more carbon,

water, and waste than their smaller competitors. And investors presumably want their portfolio companies to grow over time, requiring more of these resources. Any preference for lower use of environmental inputs without adjusting for company size injects a bias for small companies even though they may be less efficient.

More importantly, scaling by revenue allows us to measure the operational efficiency of a business and to determine which companies are creating more value using less resources. In this way, Resource Efficiency puts corporate environmental impact into human economic context. How have lives been enriched or standards of living been improved by carbon, water, and waste use? Revenue acts as a proxy for the value and human utility created by a company's environmental impact.

Measuring Earnings Surprise

In the late 1970's, the investment industry developed the Standardized Unexpected Earnings (SUE) score as a measure of "earnings surprise".¹

The SUE score is defined as follows:

$$SUE_{FY-T} = \frac{\text{Actual Earnings}_{FY} - \text{Mean Estimate of Earnings}_{FY-T}}{\text{Standard Deviation of Estimates}_{FY-T}}$$

Where:

FY: Fiscal Year

T: time in months before the Fiscal Year end date

The SUE score is calculated by computing the difference between reported earnings and the average earnings estimate, and dividing this gap by the standard deviation of earnings estimates. The intuition is that the difference between actual and consensus should be calibrated by the uncertainty in the underlying estimates. After all, a larger earnings surprise would be expected if the distribution of earnings estimates was wide. In this way, the SUE score accounts for natural differences in earnings volatility and predictability between companies.

¹ Latane, Henry A., and Charles P. Jones, "Standardized Unexpected Earnings—1971-1977." *The Journal of Finance* 34, no 3 (1979): 717-24. <https://doi.org/10.2307/2327537>

Protocol

To measure the relationship between the Osmosis Resource Efficiency score and the Standardized Unexpected Earnings (SUE), we populate the MSCI World Index constituent universe with Osmosis data for carbon, water and waste intensities and consensus earnings estimate data from Bloomberg for each fiscal year between 2010 and 2022. The entire dataset consists of 8675 observations.

For each component of Resource Efficiency (carbon, water and waste) and for Resource Efficiency overall (MoRE – Model of Resource Efficiency) we divide the universe into three distinct groups: efficient, neutral, and inefficient. To construct these groups, we sort companies within each industry by each metric and then allocate the 33.33% of companies with the lowest intensities to the efficient group, the middle 33.34% to the neutral group and the 33.33% highest intensities to the inefficient group. We then aggregate each industry’s list of companies into universe-wide efficient, neutral, and inefficient groups.

Figure 1. shows the average and median SUE scores for each of the resource intensive, neutral and efficient groups using consensus estimates one month before each fiscal year end between the year 2011 and 2022 for the MSCI World Index constituent universe.

Figure 1. SUE Score Using Consensus Estimate 1 Month Before FYE “MSCI World Index Universe”

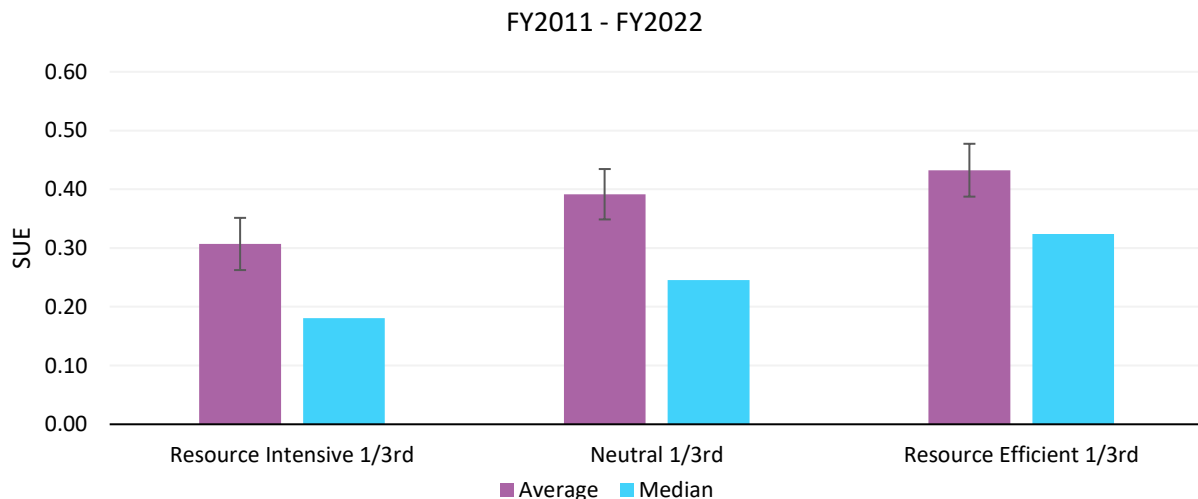
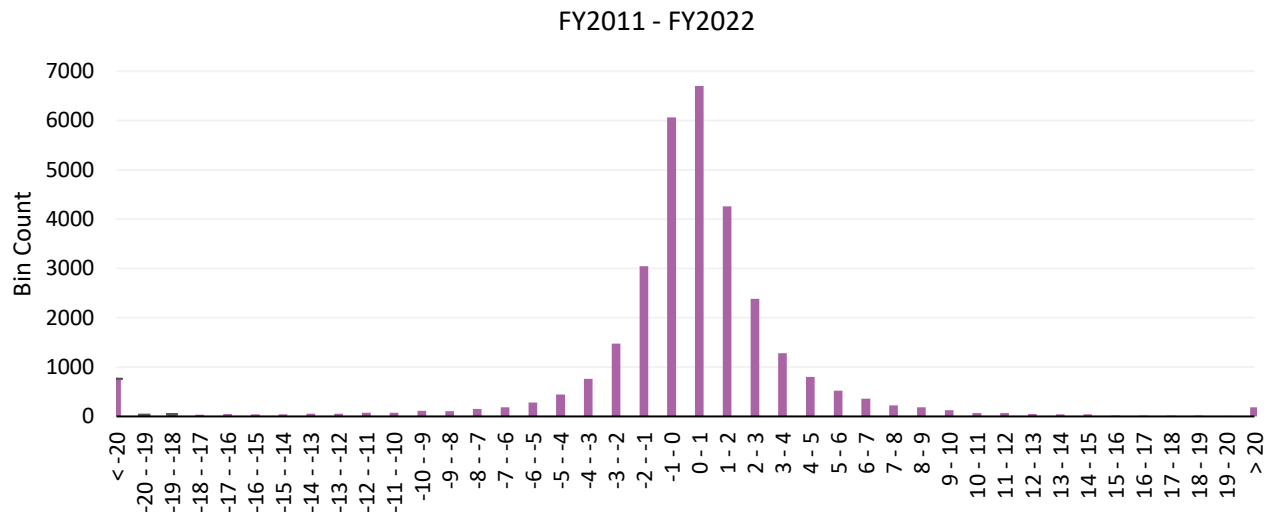


Figure 1. shows that resource efficient companies tend to report earnings that surprise the market more than their resource neutral and inefficient peers. This result is not driven by industry mix effects since a fixed percentage of each industry is used to populate the efficient, neutral and inefficient groups. The industry exposures of each group therefore are in line with each other and with the industry exposures of the overall universe.

Figure 2. shows the distribution of SUE scores in our sample.

Figure 2. SUE Score Using Consensus Estimate 1 Month Before FYE “MSCI World Index Universe”



The SUE scores in our sample universe exhibit significant kurtosis (fat tails). As a result, standard methods of statistical inference could be misleading. For this reason, we believe the median is a more accurate and robust representation than the average. In addition, the more appropriate statistical inference for difference in medians is the chi-square test shown in Figure 3.

Figure 3. Chi-Square Test for Difference in Median Between Resource Efficiency Groupings

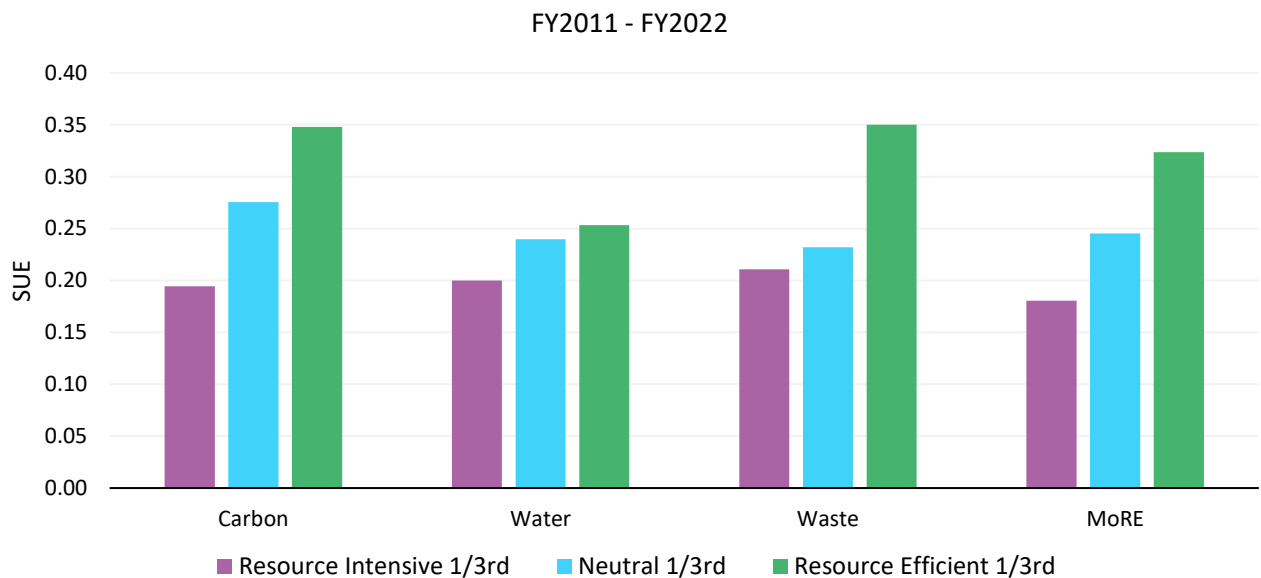
SUE Score using consensus estimates 1 month before FYE, FY2011-FY2022, MSCI World Index Universe

	<i>Less than Sample Median</i>			<i>Greater than Sample Median</i>			Total
	Observed	Expected	(O-E)² / E	Observed	Expected	(O-E)² / E	
Resource Intensive 1/3rd	1599	1553	1.34	1485	1553	3.01	4.35
Neutral 1/3rd	1566	1553	0.10	1570	1553	0.18	0.28
Resource Efficient 1/3rd	1495	1553	2.19	1605	1553	1.72	3.91
							8.54

The computed chi-square statistic of 8.54 exceeds the critical value of 5.991 at the 95% confidence level, suggesting that the different medians observed in Figure 1. are statistically significant.

Figure 4. shows the median SUE score for each of the underlying components of the Resource Efficiency score: carbon, water and waste. The relationship between efficiency and earnings surprise can be observed in each underlying metric.

Figure 4. Median SUE Score Using Consensus Estimate 1 Month Before FYE “MSCI World Index Universe”



The chi-square tests for difference in medians are shown in Figure 5. The medians of all metrics, except water, are significantly different.

Figure 5. Chi-Square Test for Difference in Median Between Resource Efficiency Groupings

SUE Score using consensus estimates 1 month before FYE, FY2011-FY2022, MSCI World Index Universe

Carbon	12.71
Water	2.29
Waste	10.24
Model of Resource Efficiency (MoRE)	8.54

Earnings estimates have a life span. Estimates are initiated before the fiscal year end and cease once results have been reported. Over that time, the estimate will evolve as analysts incorporate new information into their forecasts. Figure 6. shows the relationship between Resource Efficiency and earnings surprise using consensus estimates 12 months, 6 months, and 1 month before the fiscal year end. As before, we calculate the median SUE score for the efficient, neutral and inefficient groups over the entire sample period.

Figure 6. Median SUE Score by Resource Efficiency (MoRE) Group “MSCI World Index Universe”

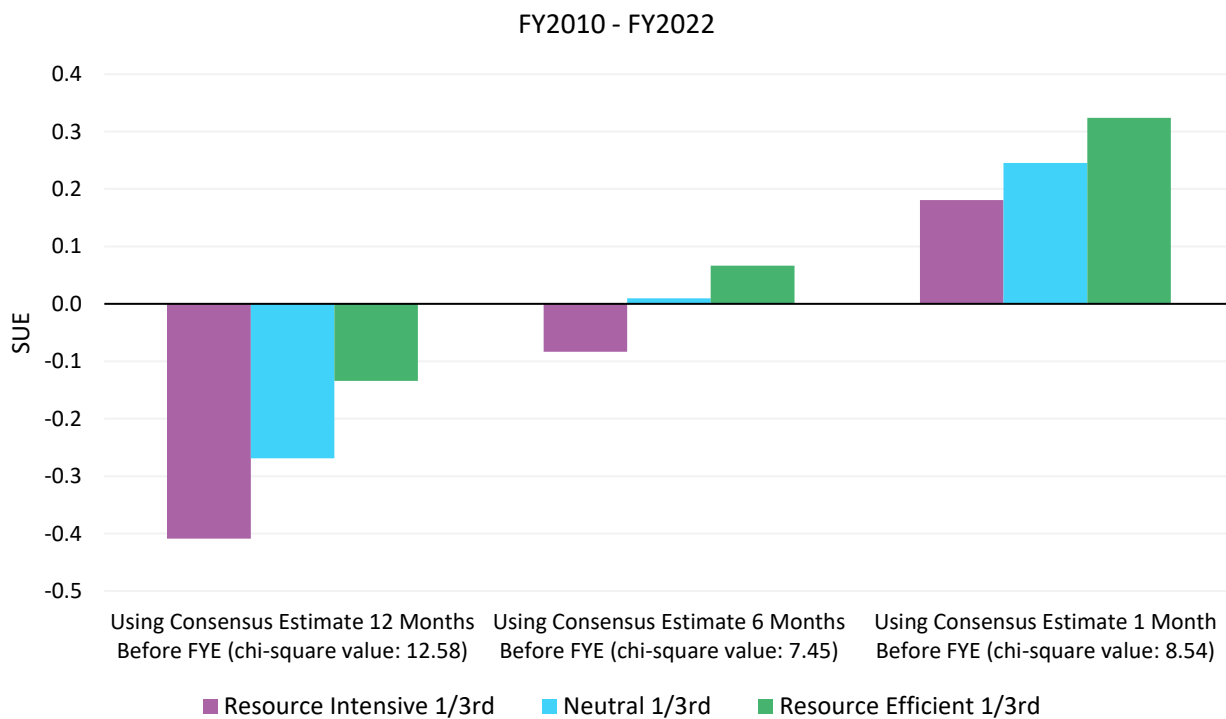
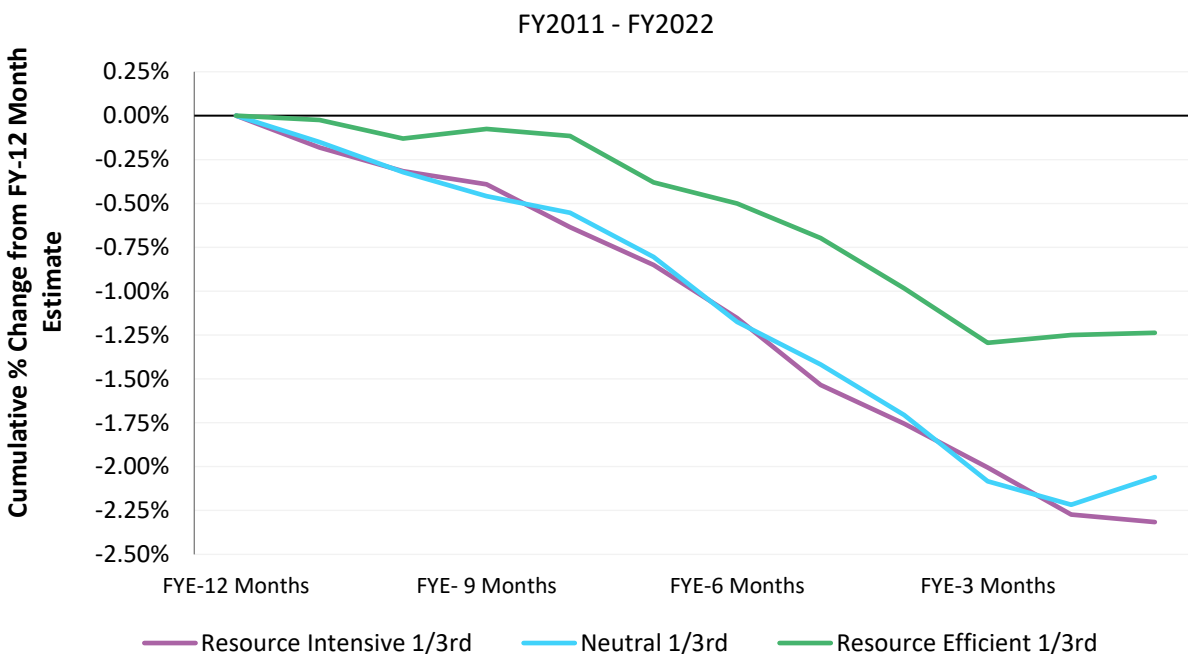


Figure 6. shows that resource efficient companies tend to earn more than market expectations, regardless of when those expectations are measured.

Earnings estimates in our sample data exhibit a typical pattern observed by others². They generally start overly optimistic and then are adjusted downward as the fiscal year-end approaches. This is why the numbers using consensus estimates 12 months prior to the fiscal year end are all negative. Resource efficient companies report earnings below the consensus estimate 12 months prior, but these “misses” are lower than the gaps reported by their less efficient peers.

In addition, resource efficient companies tend to experience less downward revisions. Figure 7. shows the median cumulative change to estimates during the 12 months before the fiscal year end. The median resource efficient company experiences a 1% decline in consensus earnings estimate, while less efficient companies experience a median of 2% decline.

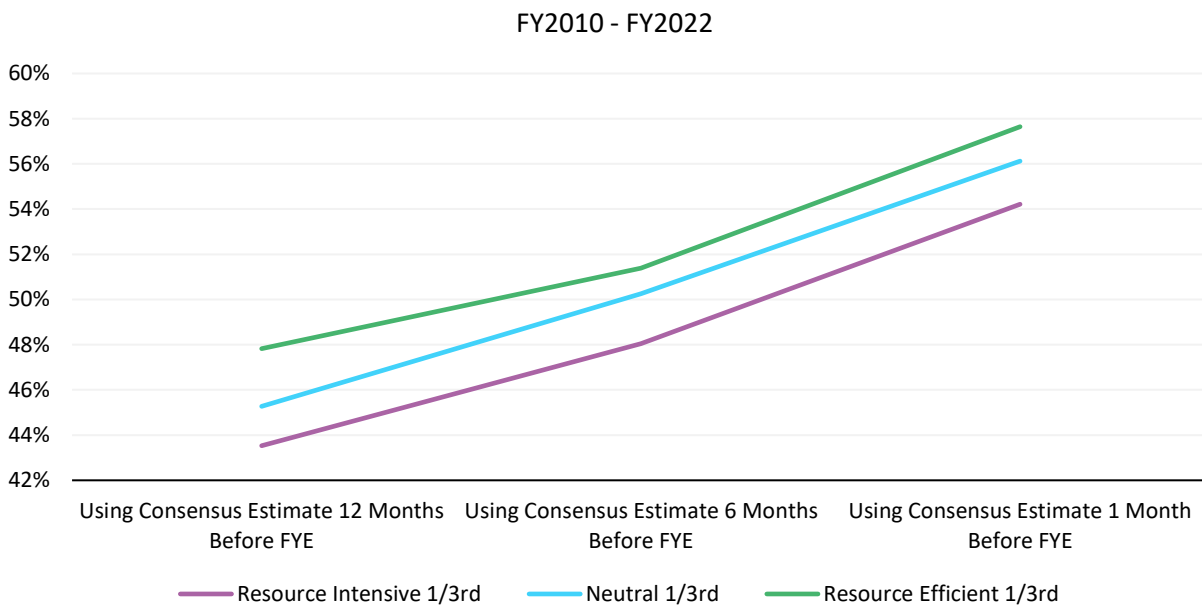
Figure 7. Estimate Revision Path By Resource Efficiency Group (MoRE) “MSCI World Index Universe”



² Richardson, Scott Anthony and Teoh, Siew Hong and Wysocki, Peter D., *Tracking Analysts' Forecasts Over the Annual Earnings Horizon: Are Analysts' Forecasts Optimistic or Pessimistic?* (June 1999). Available at SSRN: <https://ssrn.com/abstract=168191> or <http://dx.doi.org/10.2139/ssrn.168191>

The median doesn't necessarily differentiate whether resource efficient companies are beating earnings expectations by a larger amount or more often than peers. To refine the analysis, in Figure 8., we calculate the percentage of companies reporting a positive surprise in each efficiency group.

Figure 8. % of Companies Reporting Earnings Above Consensus By Resource Efficiency (MoRE) Group



Figures 1., 6. and 8. show that not only is the median surprise larger for resource efficient companies but positive surprises occur more often.

Analysis

Use of natural resources and environmental impact represent both costs and risks for companies. Mitigating those costs and risks via resource efficiency confers a benefit to the ongoing competitive profile of the business.

However, the cost advantage is unlikely to be the sole reason resource efficient companies consistently beat earnings expectations. This is because any reduction in costs that result from less use of carbon, water and waste are likely to be easily observed and anticipated by the market.

The cost advantage of Resource Efficiency may lead to higher profits, but it doesn't necessarily lead to higher-than-expected profits.

Any risk mitigation enabled by Resource Efficiency, on the other hand, could very well lead to surprises down the road. Risks, by definition, are uncertain and difficult to predict. If resource efficient companies are less exposed to unexpected dangers, any future benefit of this lower exposure would occur with uncertain timing. Such a future benefit would therefore be difficult to price efficiently since discounted fair values are very sensitive to the timing of cash flows. Even known outcomes, with uncertain timing, are very difficult for the market to price efficiently.

Resource Efficiency could also provide an unexpected boost during good times. Excess profits for efficient companies could be deployed into R&D, debt repayment, acquisitions or other long-term investments that could compound firm value over time.

Imagine an industry where water use is a critical input. Those companies that use water more efficiently are less exposed to disruptions in their operations during periods of water scarcity. These companies have a systematic advantage over their peers that would be difficult to forecast and value. Droughts do happen, we just don't know when.

Conclusion

Resource Efficiency identifies those businesses making choices today that mitigate long-term risk associated with environmental impact and resource availability. Risk that could be in the form of regulation, input costs or supply chain disruption. These are companies that will, from time to time, be able to produce more and serve more customers precisely when their competitors are constrained.

Because the timing of the Resource Efficiency advantage is uncertain, investors struggle to incorporate it into their financial forecasts. As a result, resource efficient companies tend to exceed market expectations more often and by a larger amount than peers.

The correlation between Resource Efficiency and earnings surprise could be a mechanism by which lower environmental impact translates to better equity returns, and provides compelling support for the evaluation of corporate sustainability in a comprehensive and robust investment process.

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