PGIM QUANTITATIVE SOLUTIONS

ESG SOLUTIONS: INDEXING WITH EXCLUSIONS

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ABOUT PGIM QUANTITATIVE SOLUTIONS

As the quantitative equity and multi-asset solutions specialist of PGIM, we seek to help solve complex investment problems with custom systematic solutions across the risk/return spectrum. We can customize down to the stock level for portfolio considerations, with product offerings that range from core solutions and systematic macro to multi-asset portfolios and overlays. We manage portfolios for a global client base with $113.7 billion in assets under management as of 9/30/2021.

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To learn more about our capabilities, please contact PGIM Quantitative Solutions by email at contactus@pgim.com or by phone in the US at +1 (866) 748-0643 or in the UK at +44 (0) 20-7663-3400.

ESG Indexing with Exclusions – Is It Feasible?

Demand for Environmental, Social and Governance (ESG) investing continues to expand. While asset owners grapple with the complexities of incorporating ESG parameters into their investment portfolios, asset managers are challenged by limits on accessible and consistent data. Surprisingly, passive ESG portfolios have proven to be among the most challenging to address. Despite significant growth of passive allocations over the last decade, index producers are limited in their ability to provide unique ESG solutions. We demonstrate in our recent paper, Seeking a Better Alternative to ESG Indexes, that despite the limitations of existing ESG indexes, combining our ESG framework with quantitative alpha factors and robust portfolio construction methodologies, can deliver a solution with market-like performance, market-like risk, and an enhanced ESG profile. But we know that there isn't one single-best solution for all investors. As investor preferences and needs for ESG investments vary, so must the frameworks and capabilities that we as investment managers provide to accommodate these varied requirements.

Investor beliefs vary the most around the inclusion of companies involved in particular business activities or sectors. For example, with much attention currently on climate change and COP26 – the United Nations Climate Change Conference – in the news, investors are increasingly questioning the validity of including the Energy sector in their portfolios. Regardless of whether the most attractive ESG companies within the Energy sector are favored (based on our standard approach), some investors hold the view that Energy companies simply cannot be considered ESG- or climate-friendly, and must be excluded from portfolio holdings. Consequently, strict investment policies on divesting such companies from their overall portfolios are becoming increasingly common. But from an indexing perspective, is it possible to develop an index replacement solution that produces market-like performance while favoring better ESG companies and also avoiding the Energy sector? We've worked on developing such an approach by utilizing our index replacement solution, which favors companies that rank higher on ESG attributes (as discussed in our earlier research), in combination with the exclusion of companies involved in certain business activities, to deliver market-like performance.

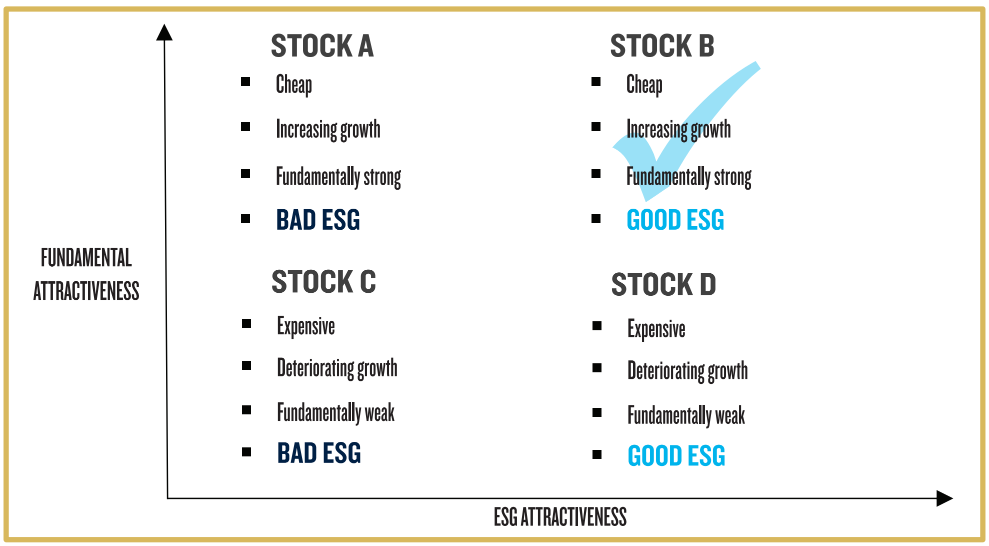
An Active Approach to Indexing

ESG investing is centered on the belief that a company's success depends on its interactions and relationships with various stakeholders: customers, employees, communities, suppliers, and the environment. Our goal is therefore to measure the quality of a firm's relationships with these stakeholders in assessing whether it warrants portfolio inclusion.

A number of factors play into our process for creating an ESG score. We recognize that key stakeholders and the corresponding ESG issues most vital to them vary in importance across industries. We center our focus on those insights where an ESG rationale will have a material impact on firm performance. The Sustainability Accounting Standards Board (SASB)framework, which sets the standards for disclosing financially material sustainability information to investors, provides a starting point for these industry-specific, material ESG issues. We subsequently apply our quantitative expertise to overcome various data comparability and availability issues and construct a proprietary ESG score.

We use our proprietary ESG score to build portfolios tilted towards high-ESG companies. However, not all high-ESG companies make attractive investments. Considering additional performance drivers may improve the quality of ESG exposure. Such an approach helps identify opportunities where the benefits of ESG are mispriced, where ESG attributes translate into growth, and where ESG quality aligns with fundamental quality.

An effective ESG portfolio should carefully balance ESG insights with performance and risk drivers.



We evaluate investment opportunities across stocks in the same industry. Our process precludes us from excluding entire sectors or industries. Instead, we use risk controls to carefully manage portfolio exposure to countries, sectors and industries. By employing careful risk controls, our approach limits the heightened active risk of excluding entire sectors or industries. Additional risk exposures (such as size) are also carefully managed to further help control risk and improve the quality of the ESG exposure.

Therefore, we believe our approach can potentially yield an ESG alternative that is risk controlled, positioned to outperform, has a meaningfully improved ESG profile, yet excludes a given sector, such as Energy.[1]

[1] There is no guarantee that such an approach will be achieved.

The Results – ESG Indexing with Exclusions

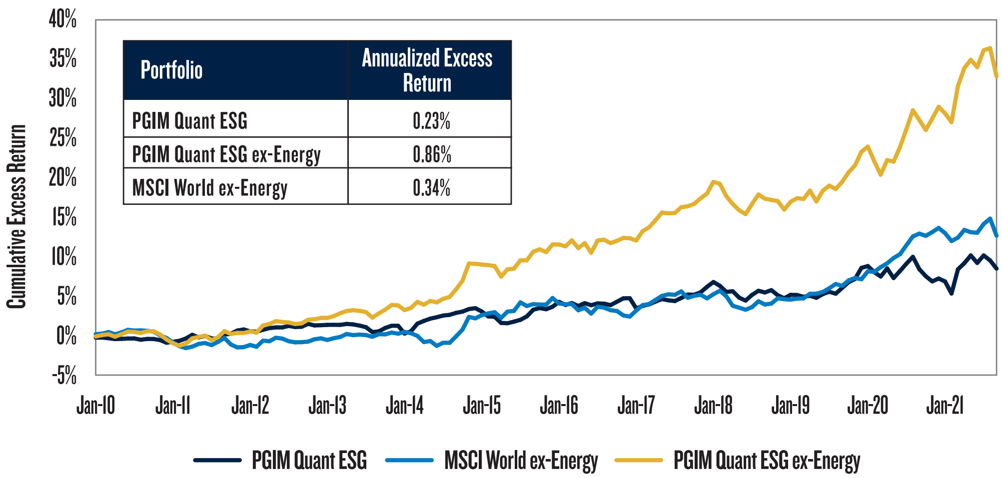
Consistent with our earlier research, we continue to present results for ESG solutions where the universe is the MSCI World Index.

For this analysis we seek to consistently deliver:

- Improved ESG exposures
- Performance comparable to the benchmark
- Low tracking error
- Beta of ~1
- Zero portfolio weight to the Energy sector

Comparative results for our simulated ESG portfolios are shown in Figure 1. Two PGIM Quantitative Solutions indexes are presented: 1) PGIM Quantitative Solutions ESG Index; 2) PGIM Quantitative Solutions ESG ex-Energy Index. Our PGIM Quantitative Solutions ESG Index targets a 20% improvement in the PGIM Quantitative Solutions ESG score relative to the MSCI World Index, while keeping risk and return attributes aligned with the benchmark. The PGIM Quantitative Solutions ESG ex-Energy Index follows a similar construction approach, with the exception of excluding exposure to the Energy sector. Figure 1 shows there is no performance impact associated with excluding Energy. The annualized excess return for our PGIM Quantitative Solutions ESG ex-Energy Index is +0.86% compared to +0.23% for the PGIM Quantitative Solutions ESG Index (gross of fees). To understand whether the improved performance is due to stock selection or due solely to the exclusion of Energy, we construct a MSCI World ex-Energy Index. Here, we reallocate the weight of the Energy sector across all remaining sectors in proportion to their index weight. We find that the annualized excess return of this index is +0.34%. As such, we can conclude that the source of the additional performance from our PGIM Quantitative Solutions ESG ex-Energy Index stems from improved stock selection arising from our alpha and ESG factors. Effectively, the weight of the Energy sector is allocated across other sectors based on attractive alpha and ESG opportunities.

Exhibit 1: Simulated ESG Portfolio Results[2]



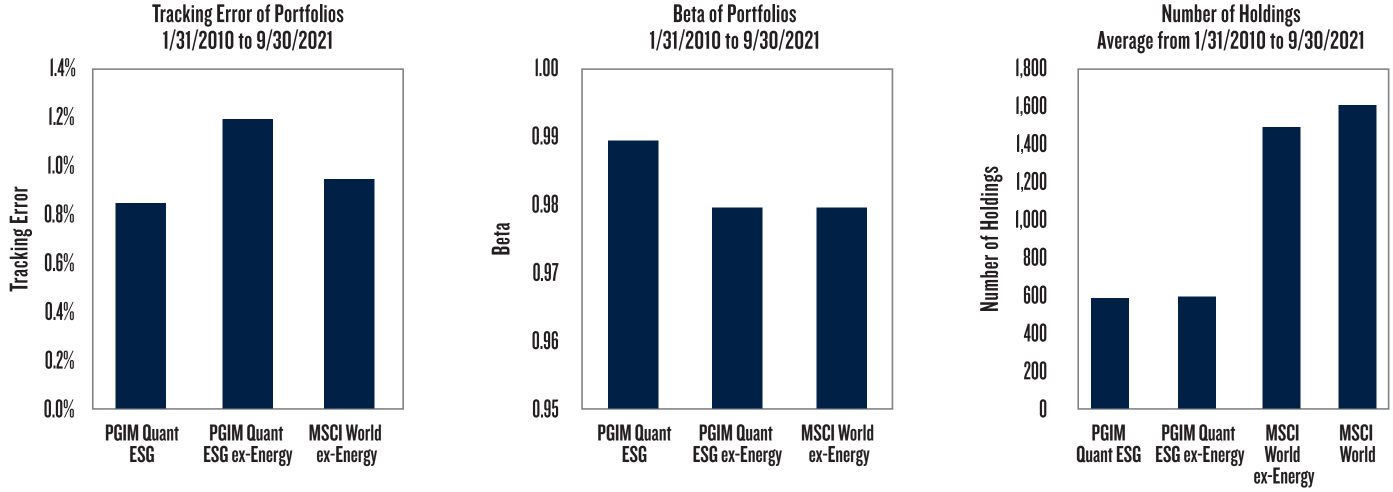
Portfolio	Annualized Excess Return
PGIM Quant ESG	0.23%
PGIM Quant ESG ex-Energy	0.86%
MSCI World ex-Energy	0.34%

Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From Jan 31, 2010 to Sep 30, 2021.

Comparisons of risk characteristics for the simulated portfolios are shown in Figure 2. For our standard PGIM Quantitative Solutions ESG Index the tracking error is ~0.80%. As was shown in our previous research, this compared very favorably to existing MSCI ESG Index solutions.

[2] For illustrative purposes only. For all simulations we assume the same level of transaction costs. Even if we exclude transaction costs for the MSCI World ex-Energy simulation, the PGIM Quantitative Solutions ESG ex-Energy solution still outperforms.

Exhibit 2: Simulated ESG Portfolio Risk Characteristics[3]



Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From Jan 31, 2010 to Sep 30, 2021.

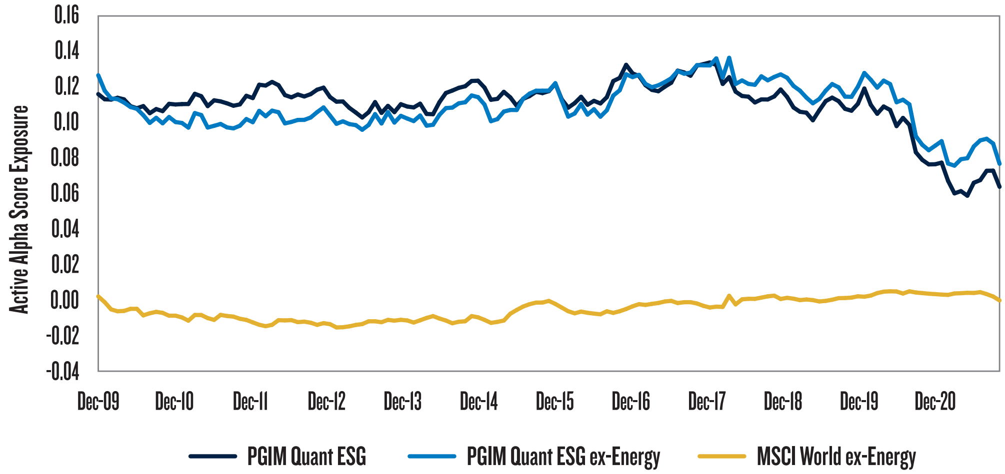
When the Energy sector is excluded, the tracking error on our PGIM Quantitative Solutions ESG ex-Energy Index increases modestly to ~1.2%. If we look at the tracking error associated with the MSCI World ex-Energy Index it is ~1%. The chart on the right in Figure 2 helps explain why the MSCI World ex-Energy Index tracking error is modestly lower than our ex-Energy solution. The MSCI World ex-Energy Index holds on average 1514 stocks, which compares to 1631 for the standard MSCI World Index. From an index weighting perspective, the exclusion of the Energy sector represented ~10% of the index in 2010 and ~2% in 2021. In contrast, our ESG index alternatives both hold ~600 stocks. As such, our ESG ex-Energy Index solution, which holds ~1000 fewer names than the MSCI World ex-Energy Index yet delivers only modestly higher active risk, shows an impressive outcome.

But what could investors gain from the increased stock selectivity in our PGIM Quantitative Solutions ESG ex-Energy Index?

The primary benefit of our index solution is improved exposure to stocks with better fundamental attributes. It's important to recall that, the PGIM Quantitative Solutions ESG ex-Energy Index is built not only from ESG insights, but also includes fundamental insights. Figure 3 shows the active exposure of our two ESG strategies along with the MSCI World ex-Energy Index to our alpha model score. Our alpha model score is built from various fundamental value, growth, and quality insights, and rates companies on a scale between zero and one. From Figure 3 it is evident the MSCI World ex-Energy Index delivers no improved exposure to stocks with better fundamental attributes. However, both of our ESG index solutions demonstrate a clear and consistent tilt towards stocks with better fundamental attributes. This tilt is critical for ESG investors because stocks with better fundamental attributes are expected to produce more reliable long-term performance. But let's revisit the excess performance shown in Figure 1; the outperformance of the MSCI World ex-Energy Index can be expected to continue only if the Energy sector is a structural underperformer, when compared to the broader market. The outperformance of the MSCI World ex-Energy Index is not expected to continue for reasons attributable to enhanced fundamental exposures. Additionally, the improved fundamental exposures of our ESG index solutions again demonstrate how we select more attractive ESG opportunities.

[3] For illustrative purposes only.

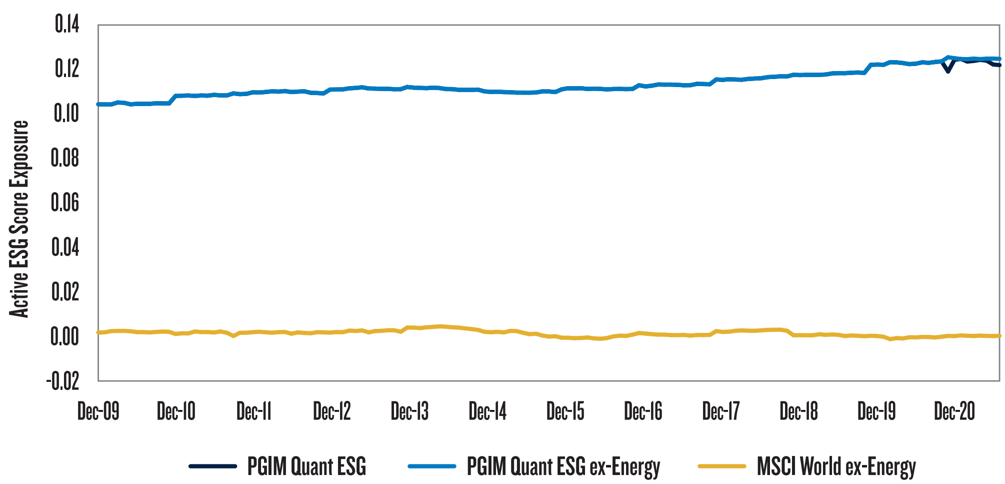
Exhibit 3: Active Exposure to Alpha Score



Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From Dec 31, 2009 to Aug 31, 2021.

In addition to improved exposure to stocks with stronger fundamental attributes, investors also gain exposure to stocks with more attractive ESG attributes. Figure 4 illustrates the active exposure of the various strategies to our ESG score. Similar to our alpha model score, the ESG score also ranges between zero and one. A telling point from Figure 4 is that for the MSCI World ex-Energy Index, investors gain no improvement in exposure to companies with better ESG attributes. Both of our ESG index solutions deliver comparably improved exposures to attractive ESG companies.

Exhibit 4: Active Exposure to ESG Scores



Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From From Dec 31, 2009 to Aug 31, 2021.

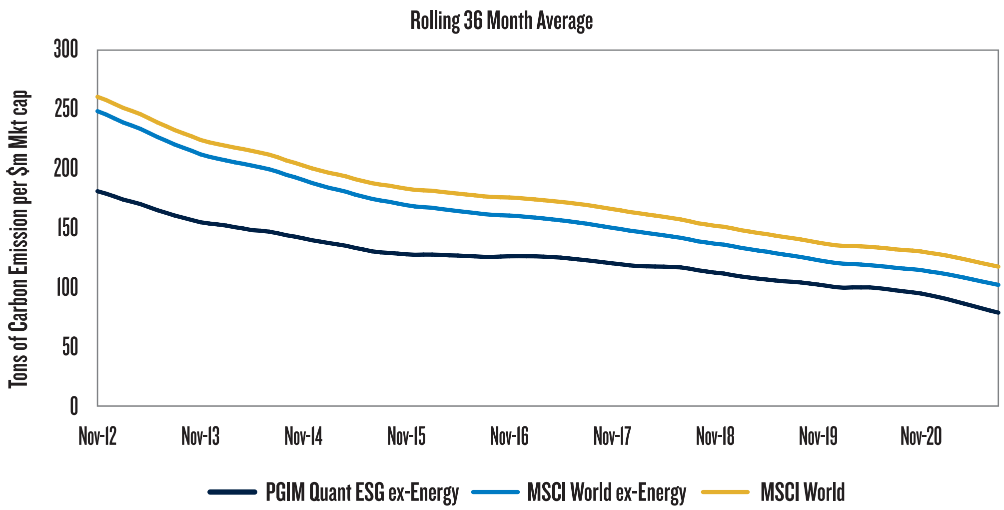
Putting it Together: Eliminating Sector Exposure

For investors most concerned about minimizing exposure to fossil-fuel-intensive companies, however, focusing on an overall ESG score exposure may not be meaningful. In this instance, we turn to raw ESG metrics starting with carbon emission intensity. Figure 5 plots the rolling 36-month average carbon emission intensity of the PGIM Quantitative Solutions ESG ex-Energy Index, the MSCI World ex-Energy Index, and the MSCI World Index. Evidently, excluding the Energy sector reduces the carbon emission intensity of the MSCI World ex-Energy Index relative to the MSCI World Index by ~8%. However, the increased selectivity of our index solution further lowers the carbon emission intensity, representing a ~29% reduction relative to the MSCI World Index.

We can further deconstruct the ESG exposure shown in Figure 4 by considering exposures to additional ESG metrics. For this, we chose to examine water usage intensity and percentage of women in management. These are two quantifiable metrics with solid coverage, which result in more meaningful information. Figure 6 plots the water usage intensity of the three strategies. Interestingly, water usage intensity is not improved by excluding the Energy sector. However, for the PGIM Quantitative Solutions ESG ex-Energy Index, we do see a meaningful reduction in water usage intensity. Across our back-test period, the reduction in water usage intensity relative to the MSCI World Index averages ~10%.

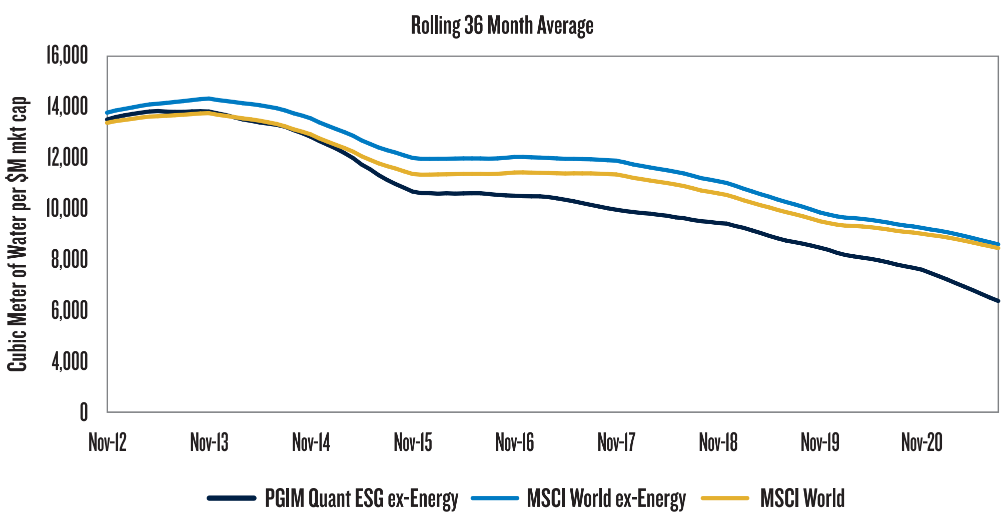
Figure 7 evaluates the portfolio-level statistics on percentage of women in management (as a proxy for diversity). We find that the MSCI World ex-Energy Index has a higher percentage of women in management when compared to the MSCI World Index. This is an indication of the male-centric nature of the Energy sector. However, our PGIM Quantitative Solutions ESG ex-Energy Index again demonstrates a further improvement in diversity.

Exhibit 5: Carbon Emission Intensity



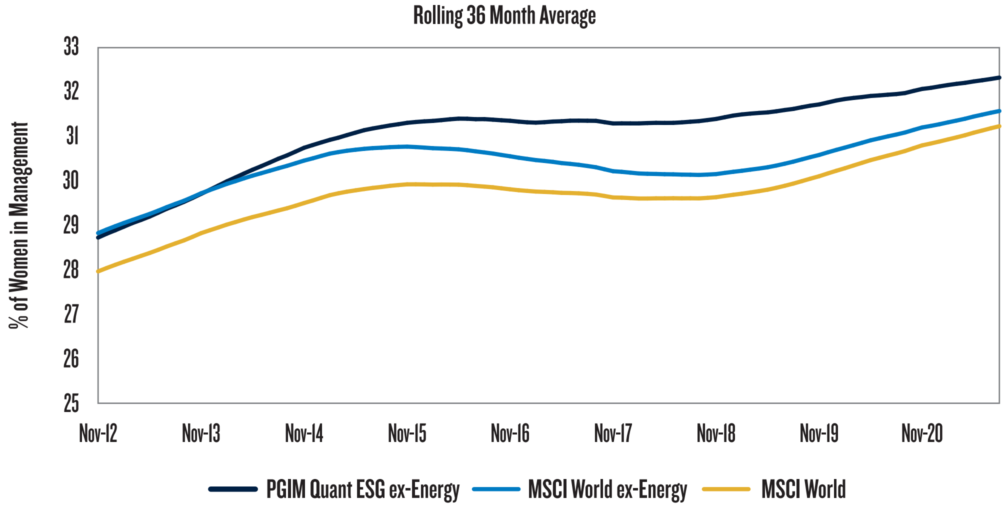
Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From Nov 30, 2012 to Aug 31, 2021.

Exhibit 6: Water Usage Intensity



Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From Nov 30, 2012 to Aug 31, 2021.

Exhibit 7: Percentage of Women in Management



Source: PGIM Quantitative Solutions, MSCI, Refinitiv, FactSet. From Nov 30, 2012 to Aug 31, 2021.

Conclusion

Our research posed the question of whether it's feasible to construct an ESG index solution that also excludes stocks involved in certain business activities. We used the Energy sector as a fossil-fuel-related business activity that investors may want to avoid to answer this question.

Utilizing our previously developed methodology for constructing alternative solutions to ESG indexes, we added a requirement that the resulting index alternative also has zero exposure to the Energy sector.

Our research shows that the resulting solution yields performance and risk attributes that we believe would be attractive to passive investors. Further, investors gain meaningful improvements in ESG attributes that a standard market index cannot provide.

For comparison, we also constructed a naïve market index that simply excludes the Energy sector. The goal was to determine whether the sophistication of our methodology produces portfolio benefits. Indeed, the results support the premise that our methodology contributes to improved performance and ESG attributes (notably carbon emission intensity) relative to this naïve alternative.

We are confident that we can deliver viable index replacement solutions that produce market-like performance, while favoring better ESG companies and also excluding companies involved in certain business activities. Because investor needs and beliefs around various business activities vary significantly, so must investment management capabilities. PGIM Quantitative Solutions accommodates these varied and specific preferences and delivers robust investment solutions that can help more investors start the journey of transitioning their passive allocations to ESG-aware alternatives.

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Notes to Disclosure

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