

| Mackenzie Resources and Energy Evolution Team

Measuring the energy transition

On September 18, 2026, Mackenzie Investments and FactSet launched a new Global Green Revenue Index to fill the gap between narrowly defined clean tech sector indices and overly inclusive ones.



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The FactSet Global Green Revenue Index

Environmental thematic investing has grown into a substantial asset class but exists without a suitable and representative benchmark. Measured against a broad global index, the sector and country positions that define the theme read as active risk, with the consequence that thematic exposure and security selection cannot be distinguished.

The available alternatives to broad indices fail on definition. Pure-play niche indices such as clean energy indices restrict the universe to power generation and the equipment that supports it, while broad green-economy indices apply a threshold loose enough that mega-capitalization technology companies become their largest holdings.

The FactSet Global Green Revenue Index seeks to fill the gap in representative benchmarks for environmental thematic approaches. Its test is whether a company sells a product or service that delivers an environmental outcome to a customer. Applied across six environmental themes and all eligible geographies, that test produces a 500-constituent benchmark of the environmental thematic universe, weighted by float-adjusted market capitalization and capped at 5% per constituent.

1. The measurement problem and the gap

Capital allocators assessing an energy transition strategy encounter a practical difficulty. Measured against a broad global benchmark, the sources of the strategy's active risk are hard to identify, its performance cannot be assessed against its own opportunity set, and the contribution of security selection cannot be isolated.

The cause is structural, rather than a deficiency in reporting. For example, an environmental thematic portfolio is necessarily overweight industrials and utilities and largely absent from financials and communication services.

The established options fall into two groups, and both fail for the same underlying reason: how each defines an environmental company. One group defines it too liberally, admitting companies for which environmental revenue is a minor (and in some cases questionable) part of the business. The other defines it too narrowly, restricting the universe to niches such as clean energy generation or water technologies and services. The reference case used throughout this paper is the FTSE Environmental Opportunities All-Share Index (EOAS) for the first and the S&P Global Clean Energy Transition Index for the latter.

Neither approach is represented by a single index. The pure-play category includes examples such as the WilderHill Clean Energy and New Energy Global Innovation indices, the Nasdaq Clean Edge series

and various other approaches. The broad category includes the wider FTSE Environmental Opportunities and Environmental Technology series, which between them run to more than a dozen regional and sub-sector indices, alongside comparable alternative energy and environmental indices from other providers.

Further removed again are the ESG-screened variants of broad market benchmarks, such as the MSCI ESG index family, in which environmental revenue is not an eligibility test at all. The EOAS holds 1,238 constituents with a market capitalization of \$15.3 trillion (USD) and the Green Revenue Index 500 with \$15.1 trillion (USD) on a float-adjusted basis, while the S&P index holds 102 constituents whose aggregate total market capitalization is approximately \$0.7 trillion (USD). What separates them is not simply size, but what each admits, and that is most visible in their largest holdings.

Exhibit 1: Ten largest constituents

MSCI ACWI	FTSE EOAS	FactSet Global Green Revenue	S&P Global Clean Energy Transition
NVIDIA 4.9%	Microsoft 12.9%	Tesla 5.0%	First Solar *
Apple 4.5%	Taiwan Semiconductor 10.3%	Caterpillar 2.8%	China Yangtze Power *
Microsoft 3.4%	Tesla * 7.0%	GE Vernova 1.9%	Bloom Energy *
Amazon 2.4%	SK Hynix 4.4%	Texas Instruments 1.8%	Nextpower *
Alphabet 1.9%	Cisco 2.9%	Siemens 1.5%	Vestas Wind Systems *
Taiwan Semiconductor 1.8%	Siemens * 1.6%	Analog Devices 1.4%	Enphase Energy
Broadcom 1.6%	GE Vernova * 1.6%	NextEra Energy 1.3%	Equatorial Energia *
Alphabet 1.5%	Texas Instruments * 1.6%	Schneider Electric 1.2%	Energias de Portugal *
Meta 1.2%	SAP 1.5%	Siemens Energy 1.1%	Plug Power
Micron Technology 1.0%	Linde 1.5%	ABB 1.1%	Chubu Electric Power *
Top ten: 24.3%	45.2%	19.3%	50.2%
Names shared with Green Revenue: 0 of 10	4 of 10	—	8 of 10

* Also a constituent of the Green Revenue Index. Sources: FactSet, FTSE Russell, S&P Dow Jones Indices, MSCI, as at August 31, 2026; Green Revenue Index composition as at May 22, 2026. Dow Jones does not publish individual constituent weights for this index.

None of the 10 largest ACWI constituents is held by the Green Revenue Index; Tesla, its eleventh largest, is the only shared name. Four of the 10 largest EOAS constituents are, and among the six not shared at the top of that index — Microsoft, Taiwan Semiconductor and SK Hynix — are the three that dominate it. Eight of the 10 largest S&P constituents are held, which is the point about the pure play: the disagreement there is not about which companies belong to the theme.

The difference from the pure play is one of proportion rather than exclusion. Eight of the 10 largest S&P constituents are also held by the Green Revenue Index — First Solar, China Yangtze Power, Bloom Energy, Nextpower, Vestas, Equatorial Energia, Energias de Portugal and Chubu Electric — but together they account for 1.4% of it, rather than the majority of it. The remaining two do not reach the 500 largest eligible companies by market capitalization.

Too liberal a definition

EOAS requires 20% of revenue to derive from environmental products and services, applied as a single threshold to every company, irrespective of size. That threshold is low enough, and the underlying classification broad enough, that general-purpose technology companies qualify. Microsoft is the largest constituent at 12.9% of the index and Taiwan Semiconductor the second at 10.3%, with SK Hynix, Cisco and SAP also among the 10 largest. The largest industry classification in the index is technology at 38.1%, ahead of industrials at 25.1%.

The question this raises is one of fit, rather than of weighting. Whatever share of Microsoft's, Taiwan Semiconductor's or SAP's revenue is classified as environmental, none of these companies exists to deliver an environmental outcome to a customer, and an investor allocating to the transition would not expect them to form the core of that allocation. Six of the 10 largest EOAS constituents — Microsoft, Taiwan Semiconductor, SK Hynix, Cisco, SAP and Linde — are ineligible for the Green Revenue Index because the

activities generating their revenue do not qualify as environmental products or services in the first place, according to the methodology developed by the co-founders of the Greenchip strategy. EOAS holds 1,238 constituents to the Green Revenue Index's 500, so the divergence is not a question of breadth. It is a question of what the definition admits.

Too narrow a definition

The S&P Global Clean Energy Transition Index defines the theme at the other end of the range. Its universe is companies producing clean energy or supplying clean energy technology and equipment, which yields 102 constituents concentrated in utilities, industrials and information technology; those three sectors account for 98% of the index. Water treatment, waste and pollution control, agriculture, sustainable transport, industrial efficiency and the materials value chain are absent, and with them substantial capital being deployed into the transition. The aggregate market capitalization of its constituents is approximately \$0.7 trillion (USD), against \$18.3 trillion (USD) for the Green Revenue Index. A definition this narrow also leaves the index exposed to a single policy-sensitive sector, with consequences for volatility and drawdown, laid out in Section 4 below.

The gap

Neither index definition adequately describes the environmental transition in its totality. The economic activity spans not just power generation and grid infrastructure, but also water treatment, waste and pollution control, agricultural inputs, rail and transport equipment, industrial efficiency and the materials that all of it requires. Representing that universe requires a definition wide enough to span the sub-themes and strict enough to exclude companies whose environmental revenue is peripheral to what they do.

That is the position the Green Revenue Index is built to fill. Where the theme itself can be measured, the residual in an attribution is selection.



2. Defining and building the index

The index methodology was designed by the Mackenzie Resources and Energy Evolution Team and rests on a green revenue taxonomy the team has used continuously for nearly two decades. The taxonomy was developed independently and predates the European sustainable finance framework; it shares the conceptual approach of defining an economic activity as green by what it produces, but it is a proprietary framework with its own criteria.

Its organizing principle is the measurement of green revenues arising from environmental products and services. The test applied is whether a company sells a product or service that delivers an environmental outcome to a customer, rather than whether the company's own operations have become more efficient. The distinction is material in practice. Software used to design and monitor environmental infrastructure qualifies; general-purpose computing and enterprise resource planning do not, irrespective of their own operating efficiency.

The taxonomy had been in use as a research framework for nearly two decades before it was used to build an index. Turning one into the other required solving a problem the framework had never had to solve: a taxonomy can rest on analyst judgement, but an index cannot. Every inclusion decision must be reproducible by a third party from published rules, at a fixed point in time, without reference to the people who wrote them. That ruled out simply codifying the existing universe. Instead, the work began from the other direction, with FactSet's Revere Business

Industry Classification System (RBICS). RBICS classifies companies' revenue bases to a granular sub-industry level, and the team reviewed the Level 6 classification in full, sub-industry by sub-industry, assessing each against the taxonomy's six themes and its products-and-services test. The data set covers more than 30,000 securities and allocates revenue across over 1,700 subcategories. The output is the eligible sub-industry set published in the methodology guide. It is the analytical content of the index: a mapping from a judgement-based framework onto a classification system maintained and audited by a third party.

The remaining design questions were resolved as rules rather than as judgements: the level of green revenue sufficient for inclusion and whether it should vary with company size; whether to fix the constituent count or allow it to vary; whether to constrain individual weights; and what to exclude outright, as distinct from what fails to qualify.

The taxonomy organizes the universe into six themes:

Theme	Representative activities
Clean energy	Renewable utilities and equipment, electric infrastructure, storage, renewable fuels
Energy efficiency	Lighting and building management, power management, automation and drives
Clean technologies	Industrial software and controls, green materials, industrial equipment, engineering
Sustainable agriculture and staples	Agricultural equipment and inputs, circular consumption and biomaterials
Water and waste	Water utilities and equipment, waste management, pollution controls
Sustainable transportation	Transportation operators and equipment, logistics

Applied to global listed equities, the taxonomy identifies approximately 2,200 companies with a combined market capitalization of around \$21 trillion (USD). The index is drawn from that universe.



3. Index rules and governance

The index is rules-based. Eligibility is determined at each semi-annual reconstitution by the following tests, applied to common stocks, ADRs and GDRs primary-listed on exchanges.

Size and liquidity

A minimum total market capitalization of \$500 million (USD) and a minimum three-month average daily trading value of \$1 million (USD), measured on Selection Day. Master limited partnerships, royalty trusts and business development companies are excluded.

Green revenue

Green revenue is measured by mapping the taxonomy onto FactSet RBICS Level 6 sub-industries and aggregating a company's revenue across the qualifying set. The threshold scales with company size:

Annual revenue	Green revenue required
Above \$1 billion (USD)	More than 20%
\$100 million to \$1 billion (USD)	More than 50%
Below \$100 million (USD)	100%

The scale reflects a judgement about materiality. Large, diversified companies are central to the transition and often carry a more dilute business mix, so a proportional test alone would exclude much of the capital actually being deployed. Smaller companies, by contrast, are of interest to a thematic investor as pure plays; a minority green business in a small company is a diversified small-capitalization holding, not a thematic one. The graduated threshold approximates absolute materiality rather than a precise measure of it, but it is applied consistently.

Exclusions

A company is excluded if it derives more than 5% of revenue from upstream oil and gas or coal production, or more than 10% from coal-fired power generation. A further screen removes companies deriving more than 10% of revenue from adult entertainment, correctional institutions, gambling or tobacco, and companies involved in controversial weapons.

Selection and weighting

From the remaining eligible companies, the 500 largest by total market capitalization form the index. A buffer is applied at reconstitution: companies ranked within the top 480 are selected and existing constituents ranked within the top 520 are retained, reducing unnecessary turnover.

Constituents are weighted by float-adjusted market capitalization, with individual weights capped at 5% and the excess redistributed proportionally. The index is reconstituted semi-annually in May and November and rebalanced quarterly in February, May, August and November.

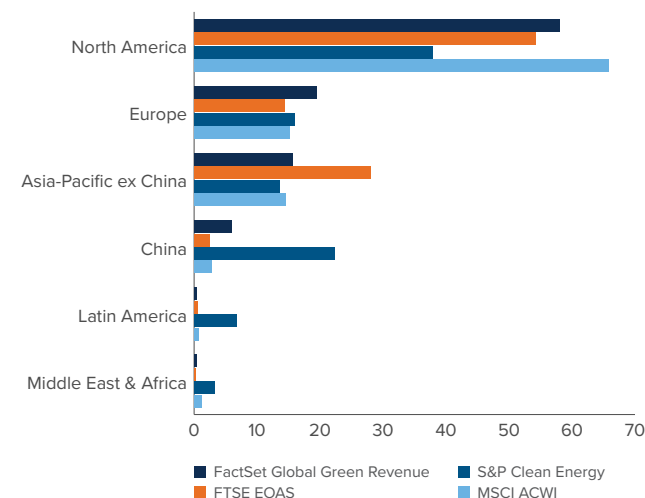
4. What the index looks like?

The index holds 500 companies with a market capitalization of approximately \$18.3 trillion (USD). Relative to the \$21 trillion (USD) taxonomy universe, measured on that same full basis, the index comprises a little under a quarter of the companies and approximately 87% of the market capitalization, representing the investable and liquid segment of the theme.

Geography

Constituents are drawn from 37 countries. The United States is 54.3% of the index, versus 62.5% for ACWI, and the developed and emerging market split is 87.9% to 12.1%, effectively identical to the broad benchmark. Japan is 8.7%, Germany 5.1%, China 4.7%, Canada 3.4% and France 3.4%.

Exhibit 2: Regional weights



FactSet, FTSE Russell, S&P Dow Jones Indices, MSCI; China includes Hong Kong listings.

Sector

Sector exposure is the dimension on which the index diverges most from the broad market. The divergence is a property of the theme rather than an expression of view.

Exhibit 3: Sector weights versus ACWI

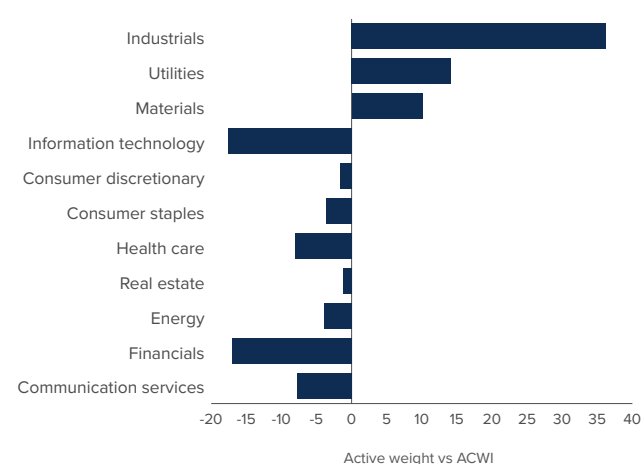
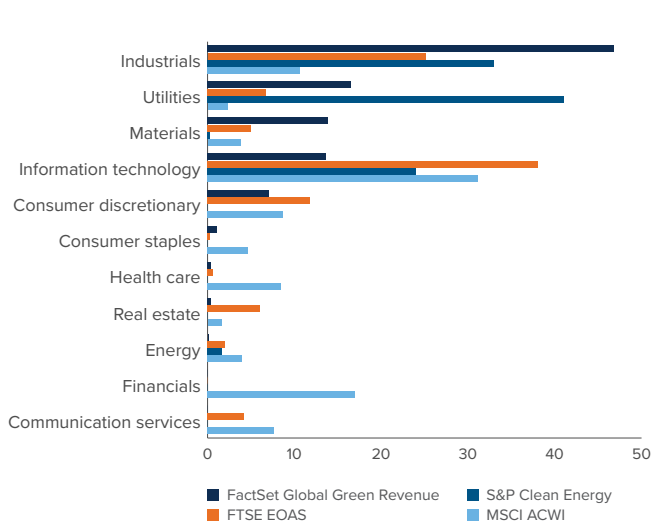


Exhibit 4: Sector weights, all four indices

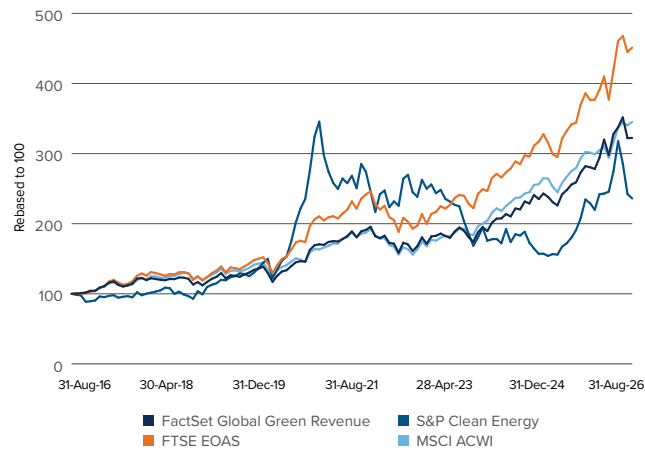


The index holds no financial services and no communication services. Its information technology weight is well under half that of the broad market and is concentrated in analog, power and automotive semiconductors rather than in memory, foundry or software. This is the quantitative expression of the argument in Section 1: any environmental thematic portfolio measured against ACWI will exhibit the majority of its active risk in these three or four sector positions, independent of decisions taken at the security level.

Risk and return

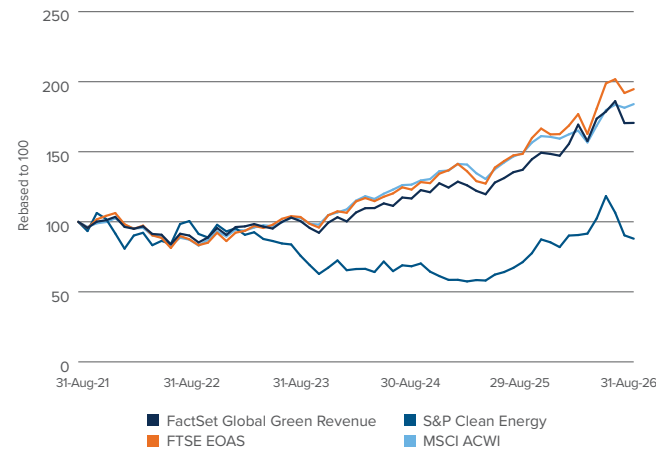
Over the 10 years ending August 31, 2026, on a Canadian dollar total return basis:

Exhibit 5: Cumulative total return, 10 years ending August 31, 2026 (CAD)



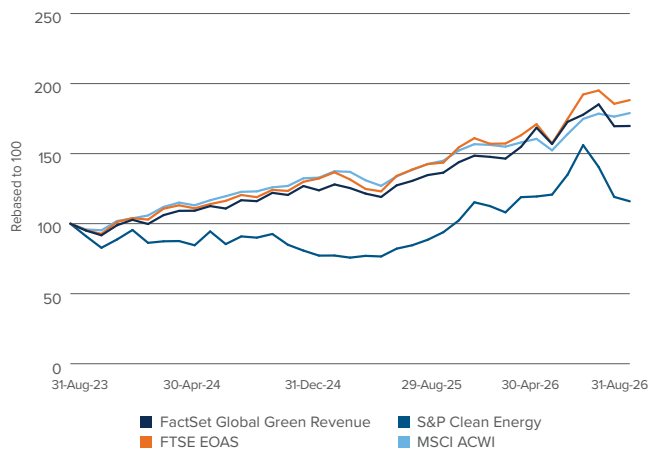
Bloomberg: 121 month-ends, August 2016 – August 2026

Exhibit 6: Total return, five years ending August 31, 2026 (CAD)



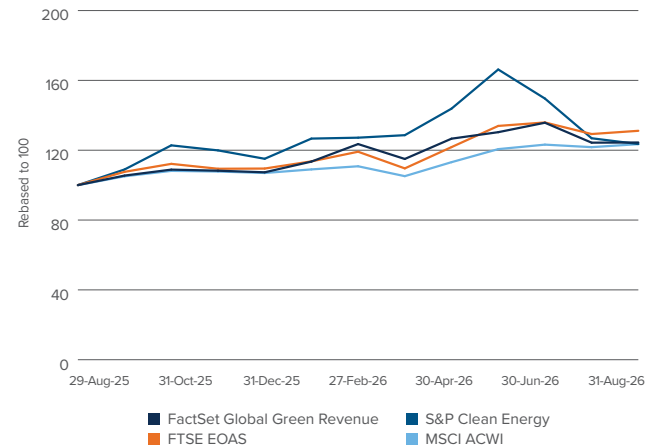
Bloomberg: 61 month-ends, August 2021 – August 2026

Exhibit 7: Total return, three years ending August 31, 2026 (CAD)



Bloomberg: 37 month-ends, August 2023 – August 2026

Exhibit 8: Total return, one year ending August 31, 2026 (CAD)



Bloomberg: 13 month-ends, August 2025 – August 2026

Exhibit 9: Risk characteristics, 10 years ending August 31, 2026 (CAD)

	Green Revenue	FTSE EOAS	S&P Clean Energy	ACWI
Annualized volatility	13.8%	15.1%	25.0%	11.5%
Maximum drawdown	-18.9%	-23.5%	-55.4%	-18.9%
Beta to ACWI	1.09	1.23	1.12	1.00
Correlation to ACWI	0.906	0.934	0.515	1.000

Two results merit attention. The index's maximum drawdown over the period was equal to that of the broad market at -18.9%, against -23.5% for EOAS and -55.4% for the pure-play index; breadth across sub-themes and the 5% weight cap are the principal contributors. The index's correlation to ACWI is also lower than that of EOAS, at 0.906 against 0.934, indicating that it is further removed from the broad market than the alternative broad environmental index, while carrying materially lower volatility than a pure play.

The index is intended as a measurement tool, and three applications follow from its construction:

- It provides a representative opportunity set against which environmental thematic strategies may be assessed.
- It permits risk to be decomposed such that thematic exposure can be separated from security selection, which is difficult against a broad benchmark and impracticable against a pure-play one.
- It also offers a transparent, rules-based reference universe for research on the sector.

5. Conclusion

The transition is financed across a broader set of activities than a clean energy index captures, and by a different set of companies than a loosely defined green-economy index selects. The Green Revenue Index resolves both failures through the definition that it applies: green revenue must arise from products and services that deliver an environmental outcome to a customer, measured against a threshold that scales with company size. Applied across six environmental themes and many countries, that definition yields 500 constituents and excludes the mega-capitalization technology companies that dominate the broader alternatives.



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