



GPIF Selected Global Environmental Stock Indices

Government Pension Investment Fund (GPIF) promotes ESG investment for the purpose of improving the long-term return of the whole asset by reducing the negative externality to the environment and society. GPIF called for applications of environmental indices for global equities and has been in the process of selection as GPIF holds the view that among important ESG issues, environmental concerns such as climate change represent a cross-border, global challenge. GPIF selected two indices that are constructed with the same methodology and commenced passive investment tracking these indices.

<Selected Indices>

Asset	Name of index
Japanese Equities	S&P/JPX Carbon Efficient Index
Non-Japanese Equities	S&P Global Ex-Japan LargeMid Carbon Efficient Index

<Main Characteristics of the indices>

1. Both indices overweight companies that have high carbon efficiency¹ within the same industry and/or disclose the amount of carbon emissions.
2. Both indices adjust the over/underweight of companies in accordance with the damage on the environment by each industry to which the companies belong (companies, which belong to an industry that have more damage on the environment, are more incentivized to improve their carbon efficiency and disclosure).
3. S&P/JPX Carbon Efficient Index covers all companies that are listed on the first section of Tokyo Stock Exchange (with some illiquid stocks excluded) thus the coverage is broader than other ESG indices.

<Comment by President Norihiro Takahashi>

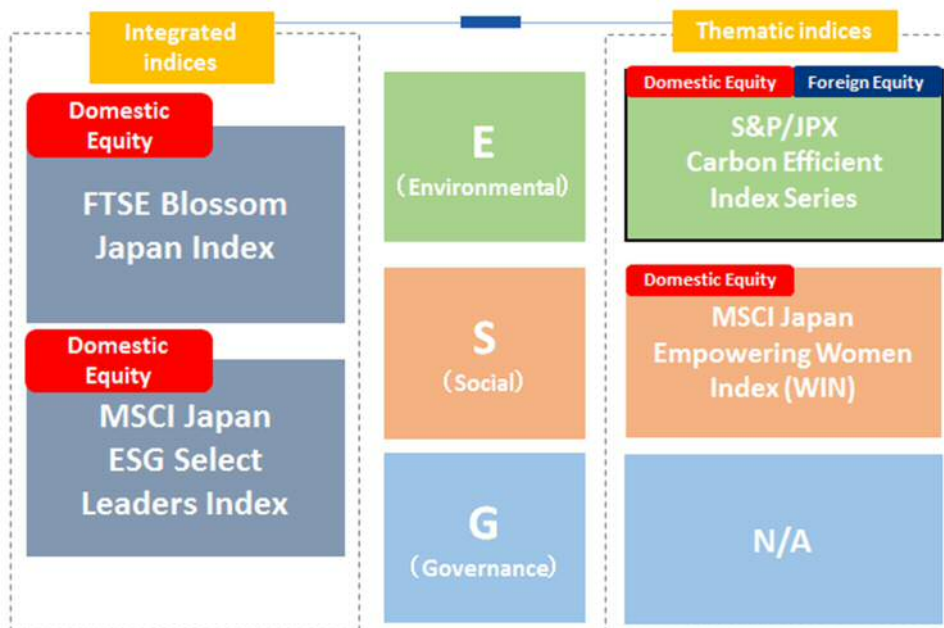
GPIF hopes that the selected Global Environmental Stock indices will provide an opportunity for companies to work on carbon efficiency and disclosure. These indices are not constructed by the divestment of companies that have more damage on the environment, nevertheless lead to accomplish lowering climate change risks by significantly reducing carbon emissions of the portfolio. Moreover, the indices can include small listed companies that were not covered by other ESG indices, which goes along with GPIF's idea to improve the sustainability of the overall market.

GPIF invests 1.2 trillion yen (approximately 10 billion dollar) at home and abroad in the passive funds

tracking these Global Environment Stock Indices. GPIF will continue to actively engage in ESG investment so as to maintain pension reserves for the future generations.

¹ carbon efficiency is the ratio of company’s greenhouse gas emissions to the revenue.

List of selected ESG indices



	FTSE Blossom Japan Index	MSCI Japan ESG Select Leaders Index	MSCI Japan Empowering Women Index (WIN)	S&P/JPX Carbon Efficient Index	S&P Global Ex-Japan LargeMidCap Carbon Efficient Index
Index concept	<ul style="list-style-type: none"> The index uses the ESG assessment scheme that is applied to the FTSE4Good Japan Index Series which has one of the longest track records globally for ESG indexes. The index is a broad ESG index that selects stocks with high absolute ESG scores and adjusts industry weights to neutral. 	<ul style="list-style-type: none"> The MSCI Japan ESG Select Leaders Index is a broad ESG index that integrates various ESG risks into today's portfolio. The index is based on MSCI ESG Research that more than 1,000 clients use globally. The index incorporates stocks with relatively high ESG scores in each industry. 	<ul style="list-style-type: none"> MSCI calculates the gender-diversity scores based on various pieces of information disclosed under “the Act on Promotion of Women’s Participation and Advancement in the Workplace” and selects companies with higher gender diversity scores from each sector. The first index designed to cover a broad range of factors related to gender diversity. 	<ul style="list-style-type: none"> Based on carbon data provided by Trucost, one of the pioneers of environmental research companies, S&P Dow Jones Indices, a leading independent provider, develops the index methodologies. The indices are designed to increase index weights of the companies which have low Carbon to Revenue Footprints (annual greenhouse gas (GHG) emissions divided by annual revenues) and actively disclose information of carbon emissions. 	
Subject of Investment	Domestic Equity	Domestic Equity	Domestic Equity	Domestic Equity	Foreign Equity
Constituent universe (parent index)	FTSE JAPAN INDEX (509 stocks)	Top 500 companies (in terms of market cap) in the MSCI Japan IMI	Top 500 companies (in terms of market cap) in the MSCI Japan IMI	TOPIX (2103 stocks)	S&P Global ex-Japan LargeMid Index (2584 stocks)
Number of index constituents	149	252	208	1694	2162
Assets under management	¥526.6 billion (4.3 billion dollars)	¥622.9 billion (5.2 billion dollars)	¥388.4 billion (3.2 billion dollars)	¥1.2 trillion (10 billion dollars)	

(Note) Number of index constituents and assets under management on the left are of March 31,2018. Ones on the right are of August 31,2018(Assets under management are of September 25,2018). Exchange rate ¥120 to the dollar. It is an approximate amount.

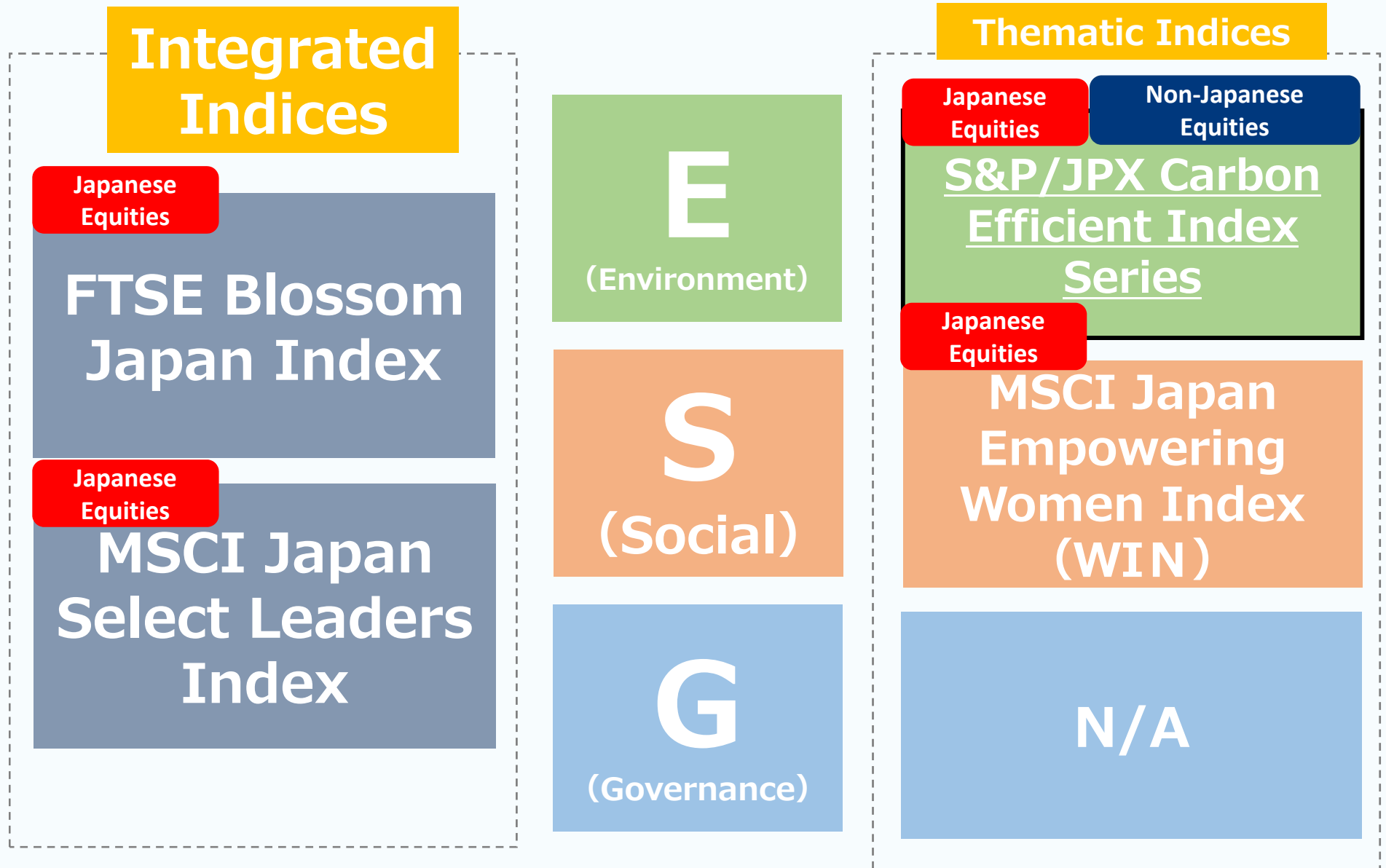


Selection Result of Global Environmental Index

Government Pension Investment Fund



ESG Indices in GPIF Investment



Excerpt from the Call for Applications

Qualification (must meet all the following conditions)

- ① Have sufficient track records in index construction and ESG research, or have a sufficient track record of index calculation using data of external institutions of ESG evaluation with a proven track record.
- ② Have track records of investment using an index developed in-house.
- ③ An office in Japan.
- ④ In the event that the index is selected and publicized, the applicant must be well prepared for inquiries from companies and media, etc., regarding the evaluation methods.

The First Screening

Requirements (for proposing ESG index)

- ① Considering that environmental issues including climate change constitute global challenges, applicants should propose two indices based on the same concept, one for (i) international equities (excluding Japanese equities) and one for (ii) Japanese equities. For the purpose of comparative analysis, it is desirable that an additional index consisting of global equities (including Japanese equities) also be submitted.
- ② The index should be based on the concept that encourages to seek the solution of environmental issues, rather than uniformly excluding companies in specific industries or types of business (so-called negative screening).
- ③ Provide the same level of returns as their capitalization-weighted index (Parent index) and improve their risk-adjusted return in the long run. Prove that through past performance and back test.
- ④ Select equities based solely on ESG factors, focusing on the environment.
- ⑤ The evaluation methodology should be highly objective, neutral and transparent.
- ⑥ Disclose data necessary for passive investment.
- ⑦ Avoid bias towards any specific company, business styles, etc.
- ⑧ Have a capacity for considerable investment.

The Second & Final Screening

Points of Global Environmental Index Selection

1. Focusing on ESG(environment information) and Positive Screening

- It is preferable for the indices to have a positive screen, as well as a comparative evaluation method within each industry. As a universal owner, GPIF's policy does not agree that indices shall divest from, or exclude, companies that have more damage on environment, such as coal or electric power companies.

2. Encouraging Disclosure. Improvement of Evaluation Method

- It'd be difficult to construct the environment index only using with disclosed information from investee companies, due to insufficient information regarding metrics such as amounts of greenhouse gas (GHG) emissions and sales total from eco-friendly products.
- GPIF's objective, which is to improve the market sustainability, can be achieved by using flags for "disclosed/non-disclosed" information, and utilize this in a scheme that will incentivize corporate disclosure (e.g. a scheme to prioritize disclosed information).
- In order to improve the evaluation methodology, index providers should disclose evaluation result as well as its methodology.

3. Governance and Conflicts of Interest

- Applying the same standard when GPIF selected ESG indices for Japanese equities in July 2017.

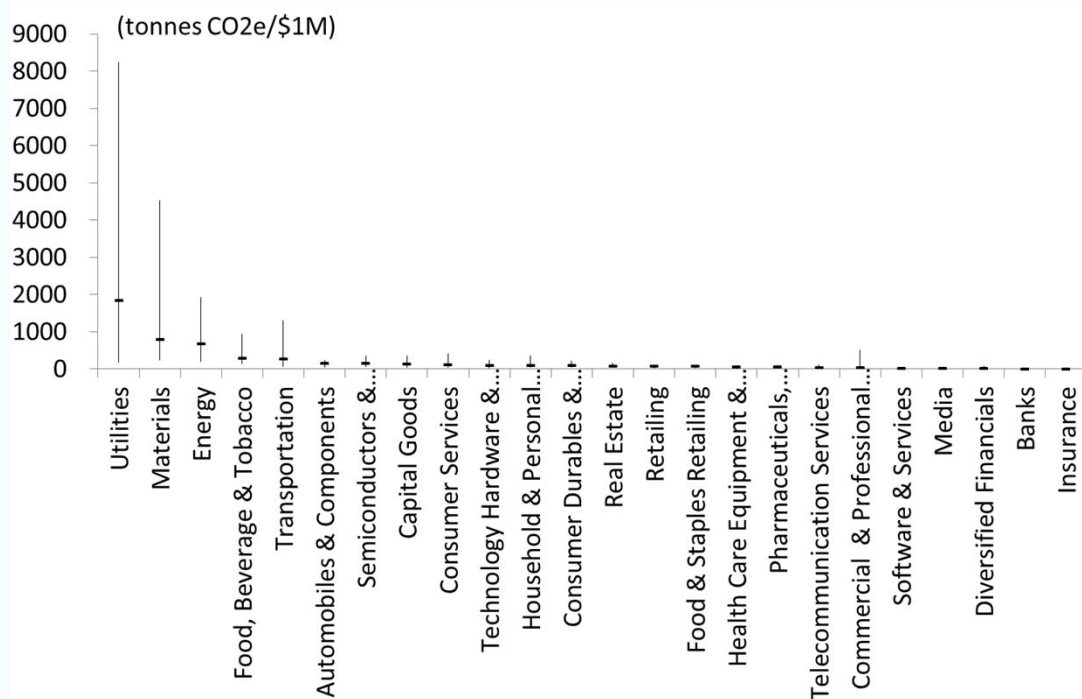
4. Largest Universe Possible

- Small-cap stocks should have opportunities to be constituents, providing improvement to sustainability within the whole market.

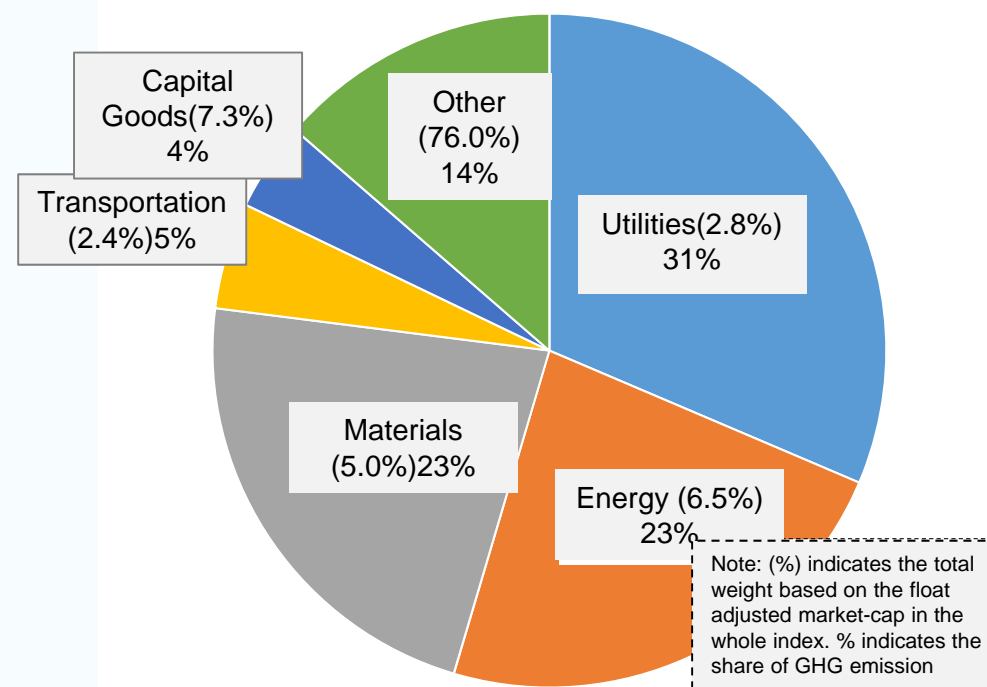
Difference of the amount of GHG by Industries

- Among the major listed companies, a high proportion of the greenhouse gas emissions are emitted by the public utilities, material, and energy industries.
- However, other companies' business may utilize the energy and materials made from these industries.
- Some pension funds overseas divest from companies that damage the environment. However, because there is a limitation to the amount of GHG caused by the entire supply chain that can be captured and understood, it would be more significant to reduce the climate change risk by encouraging the competition within each industry.

Distribution of Carbon Efficiency by industries



Amount of GHG emission by industries that constitute S&P Global Ex-Japan LargeMid Carbon Efficiency Index

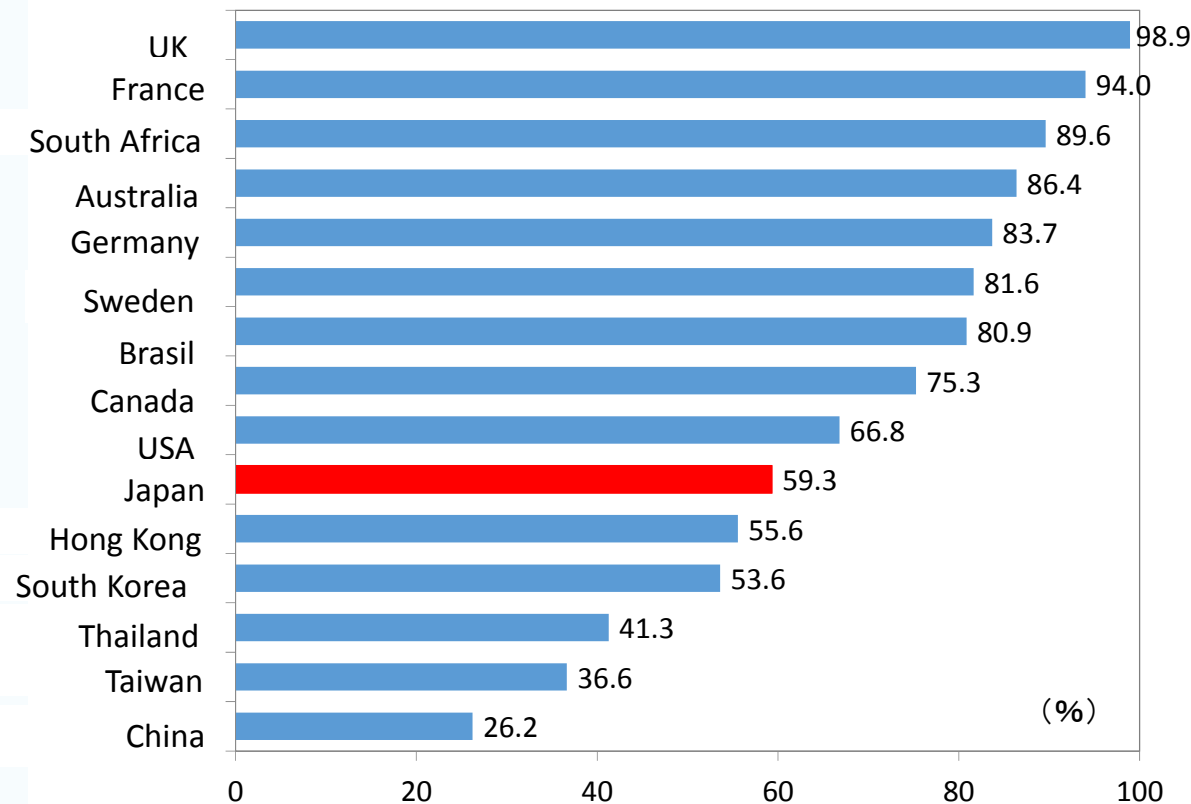


Note: Subjects are constituents of S&P Global Ex-Japan LargeMid Carbon Efficiency Index as of August 31, 2018.
Source: Trucost

Current Disclosure about GHG

- While ESG providers have increased their coverage of ESG scores for companies beyond Large/Mid-cap indices such as MSCI ACWI, public disclosure rate of GHG emissions by companies are still very low. Therefore it's very difficult to construct an index based solely on disclosed information provided by companies. Among the developed countries, Japan's disclosure rate of GHG emissions ranks the lowest.

Disclosure Rate of Amount of GHG Emissions (15 developed countries)



Note 1: Subjects are constituents of S&P Global LargeMidCap as of August 31, 2018

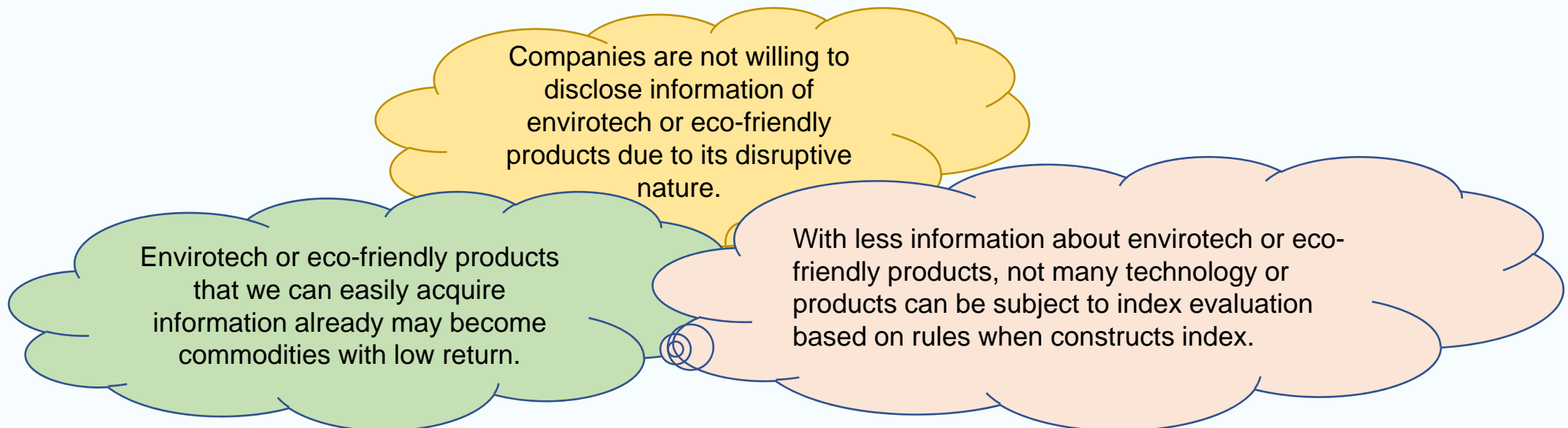
Note 2: Disclosure/Non-disclosure is classified by Trucost's assessment

Source: Trucost

Difficulty to Evaluate Environmental Technology

- During the application process, some of the proposed indices evaluated eco-friendly products or services, and reflected this assessment to the weight of the constituents or stock selection. Since society increasingly seeks out technology to resolve environmental issues, particularly climate change, more attention has been directed towards these kinds of indices.
- However, when evaluating indices with high transparency and objectivity, it is difficult to judge which technology would be better, or how much they are sold, due to the lack of disclosure. Consequently, these indices were not selected in the end.
- More disclosure of eco-friendly products or services from companies would enable to evaluate them in the active investment as well as passive investment based on rules (index tracker), which could eventually make the market more sustainable.

Barriers to Evaluate Environmental Technology



Concept of Carbon Efficient Index

- ❑ S&P/JPX Carbon Efficient Index
- ❑ S&P Global Ex-Japan LargeMidCap Carbon Efficient Index

<Concept>

- ① Overweight companies that have high carbon efficiency within the same industry and/or disclose the amount of carbon emissions.
- ② Adjust the over/underweight of companies in accordance with the damage on the environment by each industry to which the companies belong (companies which belong to industry that have more damage on the environment, are more incentivized to improve carbon efficiency and disclosure).
- ③ S&P/JPX Carbon Efficiency Index covers all companies that are listed on the first section of Tokyo Stock Exchange (with some illiquid stocks excluded) thus the coverage is broader than other ESG indices.



Note: Carbon efficiency is the ratio of company's greenhouse gas emissions to the revenue.



Carbon Efficient Index Methodology Summary

~Step1. Determining the Global Standard~

- The indices increase the weight of the companies within each industry group with low Carbon-to-Revenue (CO₂e/Revenue), and decrease the weight of companies that have high total Carbon-to-Revenue.
- Also, within the rules of the index, there are rules in places that provide companies that publically provide GHG emissions with increased weight, thus motivating companies to proactively disclose emissions.

Step 1: Determining the Global Standard

1	Universe	<ul style="list-style-type: none">• S&P Global LargeMidCap Index
2	Determine the decile thresholds for each of the Industry Groups	<ul style="list-style-type: none">• S&P Global LargeMidCap Index Rank the companies within each of the industry groups by Carbon-to-Revenue values• Determine the decile thresholds for each respective industry group
3	Determine the Impact of each of the Industry Groups	<ul style="list-style-type: none">• High Impact Industry Group• Mid Impact Industry Group• Low Impact Industry Group

Carbon Efficient Index Methodology Summary

~Step2. Determine the Constituents~

Domestic (Japan) Equity Universe (2103 Constituents)
<TOPIX>



Screening Criteria

① Liquidity Standard

- Average Daily Trading value of less than JPY 50M

② Company Disclosure Standard

- The company's GHG emissions are within the Global Top 100 emitters by total emissions, and is also not reporting emissions numbers.

③ Controversy

- The RRI score as provided by RepRisk* is over 75



Index Methodology Weight is Determined
(1694 Constituents)

Foreign Equity Universe (2584 Constituents)
<S&P Global Ex-Japan LargeMidCap Index>



Screening Criteria

① Liquidity Standard

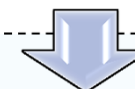
- Average Daily Trading value of less than USD 3M

② Company Disclosure Standard

- The company's GHG emissions are within the Global Top 100 emitters by total emissions, and is also not reporting emissions numbers.

③ Controversy

- The RRI score as provided by RepRisk* is over 75



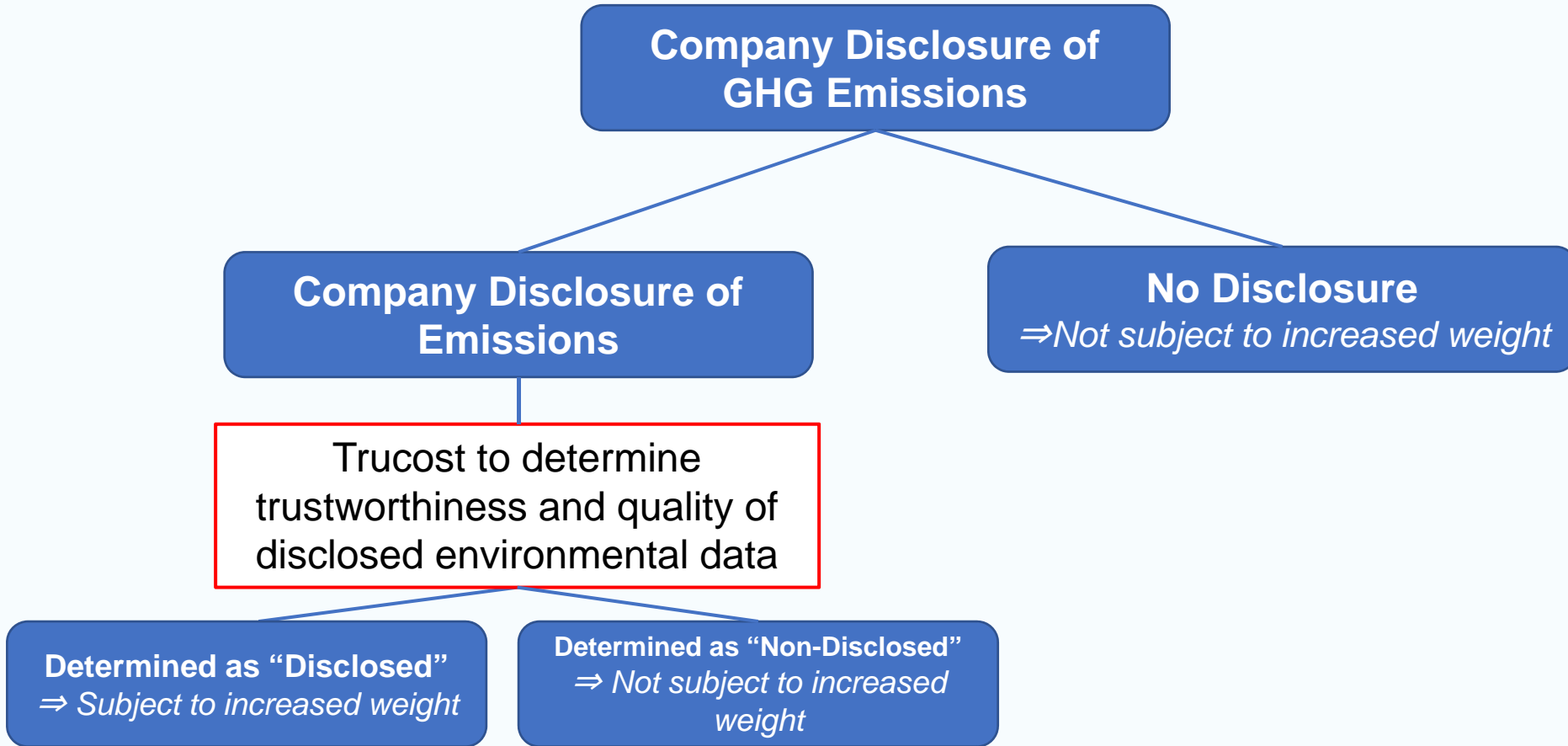
Index Methodology Weight is Determined
(2162 Constituents)

Note 1: Numbers of constituents are as of August 31, 2018

Note 2: RepRisk is a research provider, specialized in ESG risks, based in Zurich, Switzerland

Carbon Efficient Index Methodology Summary

~Step3. “Disclosed”/”Non-Disclosed” Determination~



<Decision standards for Disclosed/Non-Disclosed>

The environmental data that a company discloses are compared to the estimated value produced by the Trucost Model that is produced using various industry specific metrics, and if the company disclosed value is then classified as a “disclosed” company, the constituent is subject to a increased weight. However, if a company only produces emissions for a small domestic part of their business, or only a small portion of direct emissions from an office or factory, this company may be determined as “non-disclosed”.

Carbon Efficient Index Methodology Summary

~Step4. Determining the Weight~

Carbon Weight Adjustment = Decile Weight Adjustment x Industry Group Impact Factor

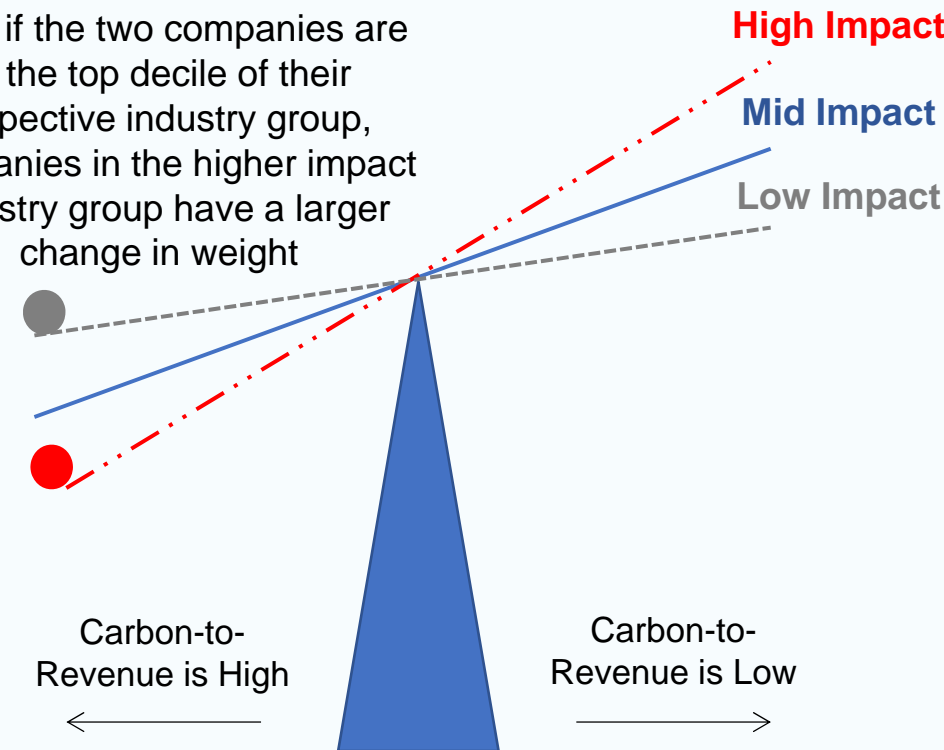
※The constituent weight is calculated by taking the weight based on the industry neutral float adjusted market capitalization and multiplying it by the Carbon Weight Adjustment

Classification of decile	Disclosed / Non-disclosed	Decile Weight Adjustment	Industry Group Impact Factor		
			Low × 0.5	Mid × 1.0	High × 3.0
the 1st decile	Disclose	40%	20%	40%	120%
	Non-disclose	30%	15%	30%	90%
the 2nd decile	Disclose	30%	15%	30%	90%
	Non-disclose	20%	10%	20%	60%
the 3rd decile	Disclose	20%	10%	20%	60%
	Non-disclose	10%	5%	10%	30%
the 4th-7th decile	Disclose	10%	5%	10%	30%
	Non-disclose	0%	0%	0%	0%
The 8th decile	Disclose	0%	0%	0%	0%
	Non-disclose	-10%	-5%	-10%	-30%
The 9th decile	Disclose	-10%	-5%	-10%	-30%
	Non-disclose	-20%	-10%	-20%	-60%
The 10th decile	Disclose	-20%	-10%	-20%	-60%
	Non-disclose	-30%	-15%	-30%	-90%

When disclosed, +10%

Industry Group Impact Factor and its relation to Carbon Weight Adjustment

Even if the two companies are in the top decile of their respective industry group, companies in the higher impact industry group have a larger change in weight



Trucost Engagement Process

Trucost Gathers Public Data and Performs Company Analysis

- Trucost to gather public company data, including financial statements, CSR/ESG reporting, CDP Reports
- Run analysis of this data to create estimates for environmental data estimates through EEIO (Environmentally-Extended Input-Output)
- If company provides specific environmental information, Trucost will confirm accuracy of data by comparing to estimates
- If the company does not provide environmental data, Trucost will rely on its modelled estimates

Trucost Sends a Letter to Company with Company Analysis

- Upon creating an environmental data report for the company, Trucost sends a letter to the company
- The letter includes information regarding how the company may access the online data
- The details in the letter will also explain how this information is used by Trucost and contact information of Trucost is included in this letter.

Company may Respond to Letter and discuss with Trucost reasoning and details of environmental data

- The company will have four weeks to respond back to the letter and engage with Trucost regarding the information that is being provided.
- Companies may contact Trucost to have a better understanding of its carbon data and may provide more information
- Based on responses from companies, environmental data is corrected as necessary and environmental database will be updated accordingly. (In case there is no response from a company, no adjustment is done).



“Global Standard” for the Carbon Efficiency by Industries and Impact Rate by Industries

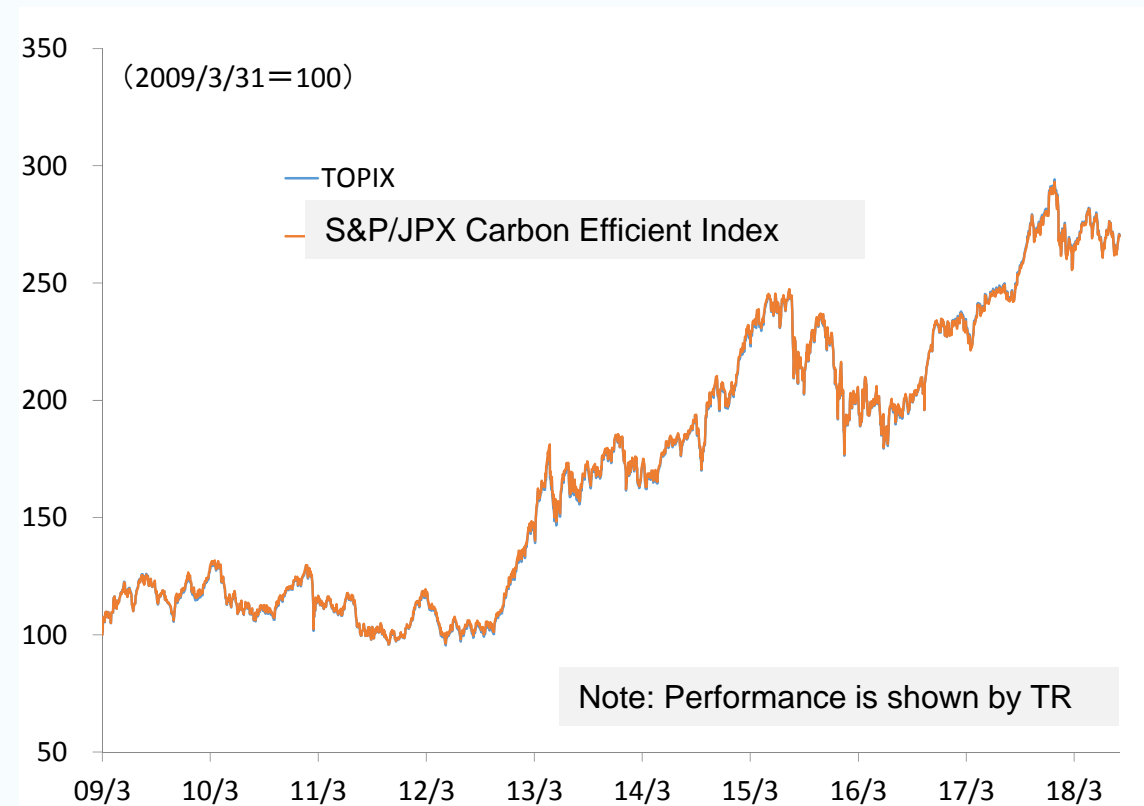
		Decile (Note: numbers indicates carbon efficient (tonnes CO2e/\$1M))						
GICS Industry Group	Industry Impact	1	2	3	4,5,6,7	8	9	10
Utilities	HIGH	-179.64	179.64-332.14	332.14-543.95	(omit)	4203.92-5076.34	5076.34-8247.42	8247.42-
Materials	HIGH	-231.95	231.95-406.88	406.88-507.21	(omit)	1648.09-2668.82	2668.82-4533.53	4533.53-
Energy	HIGH	-201.2	201.2-364.26	364.26-510.28	(omit)	961.55-1220.39	1220.39-1930.85	1930.85-
Transportation	HIGH	-68.57	68.57-76.42	76.42-101.33	(omit)	956.44-1143.91	1143.91-1299.88	1299.88-
Food, Beverage & Tobacco	HIGH	-137.1	137.1-168.54	168.54-192.06	(omit)	479.32-733.49	733.49-942.18	942.18-
Commercial & Professional Services	HIGH	-16.31	16.31-21.44	21.44-22.92	(omit)	61.9-145.9	145.9-521.82	521.82-
Consumer Services	MID	-41.05	41.05-55.14	55.14-78.44	(omit)	125.13-214.87	214.87-415.08	415.08以-
Capital Goods	MID	-50.38	50.38-66.87	66.87-79.93	(omit)	179.14-224.99	224.99-363.92	363.92-
Household & Personal Products	MID	-51.9	51.9-58.8	58.8-69.11	(omit)	138.76-159.05	159.05-353.94	353.94-
Semiconductors & Semiconductor Equipment	MID	-58.71	58.71-75.44	75.44-98.6	(omit)	163.56-239.26	239.26-348.53	348.53-
Automobiles & Components	MID	-44.28	44.28-49.67	49.67-59.67	(omit)	198.31-224.06	224.06-248.12	248.12-
Technology Hardware & Equipment	MID	-34.57	34.57-49.74	49.74-60.21	(omit)	127.93-163.56	163.56-247.87	247.87-
Consumer Durables & Apparel	MID	-43.4	43.4-58.14	58.14-68.09	(omit)	128.35-167.75	167.75-219.21	219.21-
Real Estate	LOW	-58.25	58.25-81.08	81.08-81.08	(omit)	88.77-102.87	102.87-155.8	155.8-
Telecommunication Services	LOW	-25.2	25.2-25.79	25.79-25.79	(omit)	65.65-97.35	97.35-128.82	128.82-
Pharmaceuticals, Biotechnology & Life Sciences	LOW	-40.02	40.02-47.86	47.86-52.81	(omit)	61.33-71.34	71.34-111.43	111.43-
Food & Staples Retailing	LOW	-29.08	29.08-48.48	48.48-55.43	(omit)	70.1-77.72	77.72-103.23	103.23-
Diversified Financials	LOW	-6.14	6.14-10.32	10.32-12.43	(omit)	15.06-31.42	31.42-85.28	85.28-
Health Care Equipment & Services	LOW	-17.61	17.61-34.87	34.87-47.95	(omit)	71.7-74.85	74.85-85.23	85.23-
Retailing	LOW	-26.27	26.27-44.73	44.73-50.19	(omit)	73.01-77.64	77.64-83.93	83.93-
Software & Services	LOW	-14.4	14.4-16.14	16.14-19.3	(omit)	25.54-33.16	33.16-44.73	44.73-
Media	LOW	-13.95	13.95-15.39	15.39-16.37	(omit)	27.39-30.21	30.21-40.25	40.25-
Banks	LOW	-5.65	5.65-5.65	5.65-6.39	(omit)	12.65-14.67	14.67-24.27	24.27-
Insurance	LOW	-3.43	3.43-3.82	3.82-4.38	(omit)	5.4-7.91	7.91-14.03	14.03-

Carbon Efficient Index Performance

~S&P/JPX Carbon Efficient Index~

- While maintaining roughly the same Risk/Return profile as the parent index, TOPIX, this index decreased their Carbon-to-Revenue footprint by 24.5%

Mar.31, 2009 to Aug.31, 2018 (JPY)	TOPIX	S&P/JPX Carbon Efficient Index
Annualized Return <TR, JPX> (Return of the last year)	11.14% (9.58%)	11.12% (9.68%)
Annualized Volatility	16.65%	16.61%
Risk-Adjusted Return	0.67	0.67
Annualized Excess Return <TR, JPX>	-	-0.02%
Annualized Tracking Error	-	0.55%
Information Ratio	-	-0.03
Average Annual Turnover at Rebalancing <one-way>	-	7.95%
Carbon-to-Revenue Footprint *	212.26	160.18
Carbon-to-Revenue Footprint Reduction		24.5%



Note: Carbon-to-Revenue Footprint is tonnes carbon emissions per

Source: Created by GPIF based on information from S&P Dow Jones

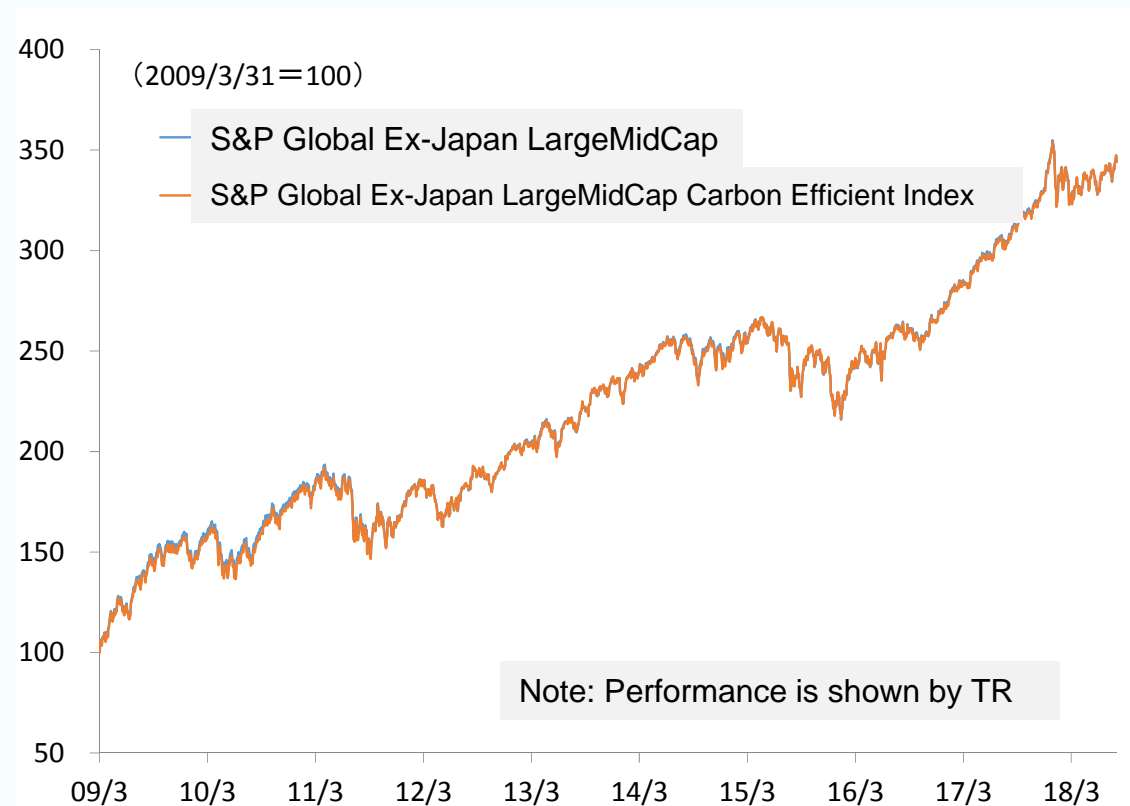


Carbon Efficient Index Performance

~S&P Global Ex-Japan LargeMidCap Carbon Efficient Index~

● While maintaining roughly the same Risk/Return profile as the parent index, S&P Global Ex-Japan LargeMidCap Index, this index decreased their Carbon-to-Revenue footprint by 40.9%

Mar.31, 2009 to Aug.31, 2018 (USD)	S&P Global Ex-Japan LargeMidCap	S&P/JPX Carbon Efficient Index
Annualized Return <TR, USD> (Return of the last year)	14.02% (12.02%)	14.03% (12.43%)
Annualized Volatility	14.07%	14.08%
Risk-Adjusted Return	1.00	1.00
Annualized Excess Return <TR, USD>	-	0.01%
Annualized Tracking Error	-	0.54%
Information Ratio	-	0.02
Average Annual Turnover at Rebalancing <one-way>	-	10.32%
As of Aug.31, 2018		
Carbon-to-Revenue Footprint *	297.01	175.54
Carbon-to-Revenue Footprint Reduction		40.9%



Note: Carbon-to-Revenue Footprint is tonnes carbon emissions per

Source: Created by GPIF based on information from S&P Dow Jones

(Reference) About S&P Dow Jones Indices and Trucost

S&P Dow Jones Indices

S&P Dow Jones Indices

A Division of S&P Global

- In September 2011, S&P Indices and Dow Jones Indexes announced the merger to become S&P Dow Jones Indices, and the company was officially established in June 2012 after completion of paper works.
- As a world leading independent index provider, S&P Dow Jones Indices are providing services global markets including the United States and Japan.








Trucost

- Trucost was established in 2000 to measure the environmental performance of companies. Today, Trucost quantifies complete environmental performance profiles for over 14,000 companies representing 99% of global market capitalization, and it's research coverage is expanding.
- Trucost became a part of S&P Global in October 2016, and continuously providing companies' environmental data globally including S&P Dow Jones Indices for their ESG related business.

(References)

List of ESG indices GPIF selected

	 FTSE Blossom Japan Index <small>FTSE Blossom Japan</small>	 MSCI Japan ESG Select Leaders Index <small>MSCI ジャパンESG セレクト・リーダーズ指数</small>	 MSCI Japan Empowering Women Index (Win)	 S&P/JPX Carbon Efficient Index	 S&P Global Carbon Efficient Index S&P Global Ex-Japan Large Mid Carbon Efficient Index
Concept	<ul style="list-style-type: none"> • FTSE's ESG index series. • Utilize the globally established FTSE4Good Index ESG rating methodology. • Integrated index by screening constituents with high ESG rating, and industry neutral weighting. 	<ul style="list-style-type: none"> • Integrated index constituted by MSCI's ESG research. Reflect various ESG risks comprehensively into the market portfolio. • Include stocks with relatively high ESG rating among industry. 	<ul style="list-style-type: none"> • Calculate gender diversity scores based on various information disclosed under "the Act on Promotion of Women's Participation and Advancement in the Workplace". Constitute index including companies with the high score from each industry. • The first index to select stocks from various perspectives in this field. 	<ul style="list-style-type: none"> • Based on carbon data provided by Trucost, one of the pioneers of environmental research companies, S&P Dow Jones Indices, a leading independent provider, develops the index methodologies. • Based on carbon data provided by Trucost, one of the pioneers of environmental research companies, S&P Dow Jones Indices, a leading independent provider, develops the index methodologies. <p>The indices are designed to increase index weights of the companies within the industry which have low Carbon to Revenue Footprints (annual greenhouse gas (GHG) emissions divided by annual revenues) and actively disclose information of carbon emissions.</p>	
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Universe	FTSE JAPAN INDX (509 stocks)	Market cap top 500 in MSCI Japan IMI	Market cap top 500 in MSCI Japan IMI	TOPIX (2103 stocks)	S&P Global Large Mid Index (ex.JP) (2584 stocks)
# of Constituents	149	252	208	1694	2162
AUM	526.6 billion JPY	622.9 billion JPY	388.4 billion JPY	1.2 trillion JPY in total	