



Index Insights | Sustainable Investment

Carbon disclosures in listed real estate

An assessment of current climate data
and disclosure in the listed real estate
sector and insight into FTSE solutions

September 2024

 **measurabl**



**FTSE
RUSSELL**
An LSEG Business

AUTHORS

Jared Butters

Sustainable Investment Product Specialist,
FTSE Russell

Jared.Butters@lseg.com

Sara Anzinger

Senior Vice President, Measurabl

Sara.Anzinger@measurabl.com

Lee Clements

Head of Applied SI, Global Investment
Research, FTSE Russell

Lee.Clements@lseg.com

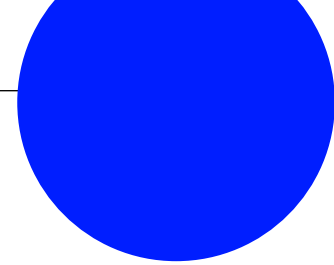
Ali Zaidi

Head of Real Assets Research, FTSE Russell

Ali.Zaidi@lseg.com

Contents

Executive summary	3
Section 1: Opportunities and Challenges in Sustainable Listed Real Estate	4
Risk and Reward – The Potential for Transition Risks to Enhance Listed Real Estate Returns	4
Carbon Accounting – Difficulties in Quantifying Exposures at a Corporate Level	5
Scope 3 Factors in the Listed Real Estate Sector	6
Section 2: Assessment of Disclosures in the EPRA Nareit Universe	8
Carbon Emissions Disclosure and Tenant Emissions.....	9
Embodied Carbon Disclosures	12
Emissions Reporting Case Study – Wharf Real Estate and Mitsubishi Estate	13
Reporting Standards and Carbon Disclosures.....	14
Section 3: Measurabl Data Spotlight – A Comparative Analysis to Public Disclosures	16
Findings on Differences in Absolute Energy and Carbon	17
Factors Affecting Energy and Carbon Intensities.....	18
Section 4: Investing in green real estate through FTSE EPRA Nareit Green indices	20
Section 5: Index Works – Calibration for an Evolving Asset Class.....	23
Conclusion	28
Appendix A – Measurabl Data Modelling and Confidence Analysis	29
Data preprocessing.....	29
Model Features and Importance	30
Confidence metrics	30



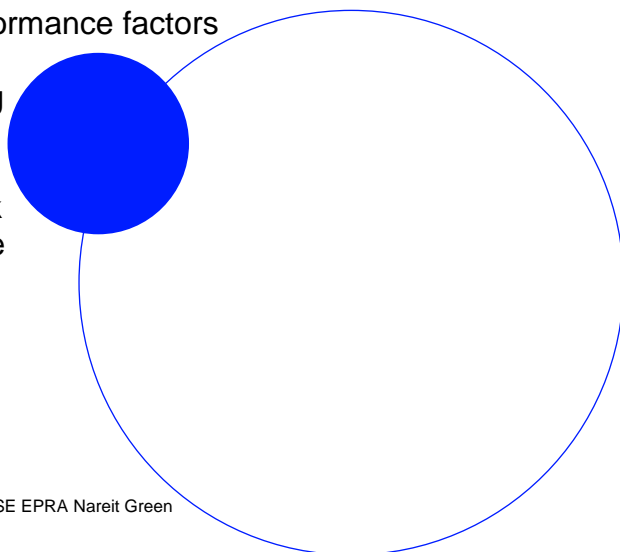
Executive summary

The greening of the built environment is a key element in reducing carbon emissions, aligning the world to a net zero trajectory and dealing with other issues, such as urban pollution. It is also very important for multi-asset investors wanting to combine a diverse portfolio with sustainable investment. Aligning the real estate segment of their portfolio can be challenging, however, due to the sector's unique climate exposures. This paper will focus on the difficulties companies in this sector currently face in quantifying their carbon emissions exposures, and the tools FTSE Russell and partner Measurabl offer to help investors navigate this space, and the resulting index outcomes.

The paper first looks at public carbon emissions disclosures across a sample of the largest companies in the FTSE EPRA Nareit Developed Index. We find large heterogeneity in classifications and scopes of emissions disclosed across the sample, especially focussing on the disclosure and classification of tenant and embodied carbon emissions categories. We then compare the Measurabl estimated emissions data against public disclosures and actual measured meter data. We find that Measurabl estimated emissions data reports higher figures on average than the two alternative approaches, due to the consideration of full building floorspace and Scope 3 tenant emissions factors.

The FTSE EPRA Nareit Green Index Series was first launched in 2017, offering climate real estate index solutions in partnership with the European and North American real estate associations EPRA and Nareit. Since then, the index series has expanded to include the Green Target Indices, launched in 2022 and incorporating FTSE's target exposure methodology. The indices combine the liquidity advantages of REITs, the lower correlation to the broader equity market and a low tracking error to the parent FTSE EPRA Nareit index. Together these indices now represent a leading global solution in climate real estate with billions in assets tracking globally¹.

We look at the historical and future performance factors of the FTSE EPRA Nareit Developed Green Low Carbon Target Index, finding that office and residential sector active weights drove tracking error throughout the COVID period, with sector and stock initiatives having high potential to dictate future index outcomes.



¹ Data as of July 2024, representing publicly disclosed assets tracking FTSE EPRA Nareit Green and FTSE EPRA Nareit Green Target standard and custom indices.

Section 1: Opportunities and Challenges in Sustainable Listed Real Estate

Risk and Reward – The Potential for Transition Risks to Enhance Listed Real Estate Returns

The built environment, including building construction and operations, represents over 40% of global emissions, and as such will play a key role in the transition towards net zero. The listed real estate sector will be exposed to many of the resulting transition risks, with the potential to impact return profiles.

The implementations of new regulations, currently most prevalent at a municipal level, will be a strong driving force behind the transition. Policies range from certification requirements to carbon pricing, and implementation timelines are often aligned to net zero transition dates. As the regulatory burden placed on property portfolios increases, the costs of bringing misaligned portfolios to bear could be substantial. Below are some examples of policies already existing and coming into force globally:

- In Singapore, the Green Building Masterplan laid out in 2006 will target 80% of all buildings to hold 'Green Mark' certifications by 2030, with certification being a requirement for all new buildings. Currently, close to 55% of buildings have achieved certification².
- The UK and Hong Kong have both introduced policies on energy savings for buildings. Hong Kong has targeted a 40% energy reduction by 2025, from a 2015 baseline³, while in 2018 the UK implemented minimum standards for energy efficiency on rental properties, currently outlawing just those least efficient properties rated EPC F or G.
- New York recently passed Local Law 97 as part of its ambition to make the city carbon neutral by 2050. The policy introduces staged carbon caps for different property types. As of 2022, roughly 65% of properties were over the proposed 2030 caps⁴

All these regulations represent investment obligations, to bring existing stock up to standard. The UK Government has estimated that in order for all buildings to reach the EPC C standard required for net zero pathways, retrofitting costs could be up to £65bn by 2035⁵. Globally, over 90% of existing building stock requires retrofitting if it is to meet 2050 net zero targets, with an estimated annual investment requirement of \$500bn associated⁶.

This investment, combined with constrained supply on retrofitting in many markets, implies premiums on existing building stock already aligned. In a recent study, JLL found 'Green Premiums' – defined as rental premiums on stock with Green Certifications – across all of its global markets; ranging from 7.1% in North America to 11.6% in London.

² [Singapore: Transforming the built environment \(worldfutureenergysummit.com\)](https://www.worldfutureenergysummit.com)

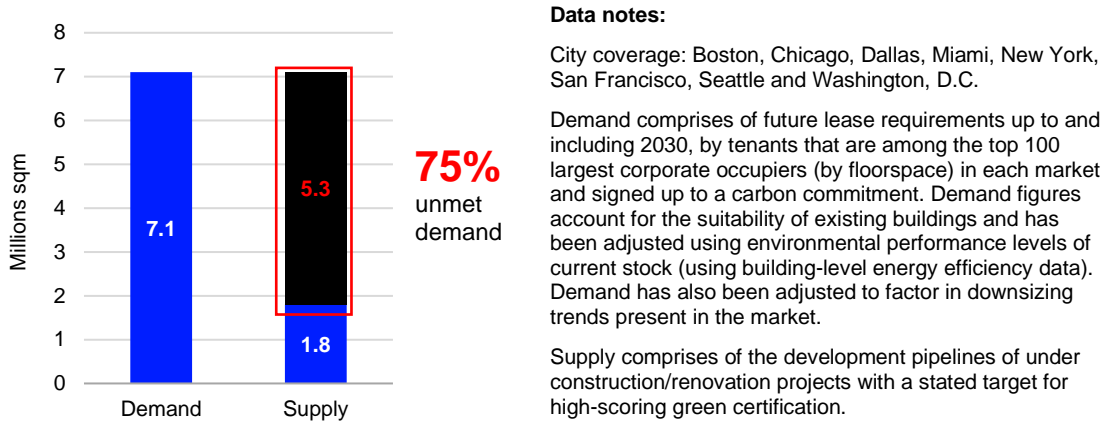
³ [Energy Saving and Green Building - Carbon Neutrality and Sustainable Development \(cnsd.gov.hk\)](https://www.cnsd.gov.hk)

⁴ [Local Law 97 - Urban Green Council](https://www.urbandecor.com)

⁵ [Energy Efficiency of Existing Homes - Environmental Audit Committee - House of Commons \(parliament.uk\)](https://www.parliament.uk)

⁶ [Retrofit Revolution | UBS Sustainability and Impact Institute | UBS Global](https://www.ubs.com)

Figure 1: Supply-Demand Imbalances in US Green Real-Estate



Source: JLL Research, September 2023⁷

However, despite green-certified stock having the smallest premiums, they also found that the supply gap for green property was highest in the US, with 75% of future regulatory demand unmet in current property stock⁷. Premiums on energy efficiency are also well established, with Energy Star finding rental premiums of 3-16% on energy efficient buildings when compared to typical buildings in the US market⁸.

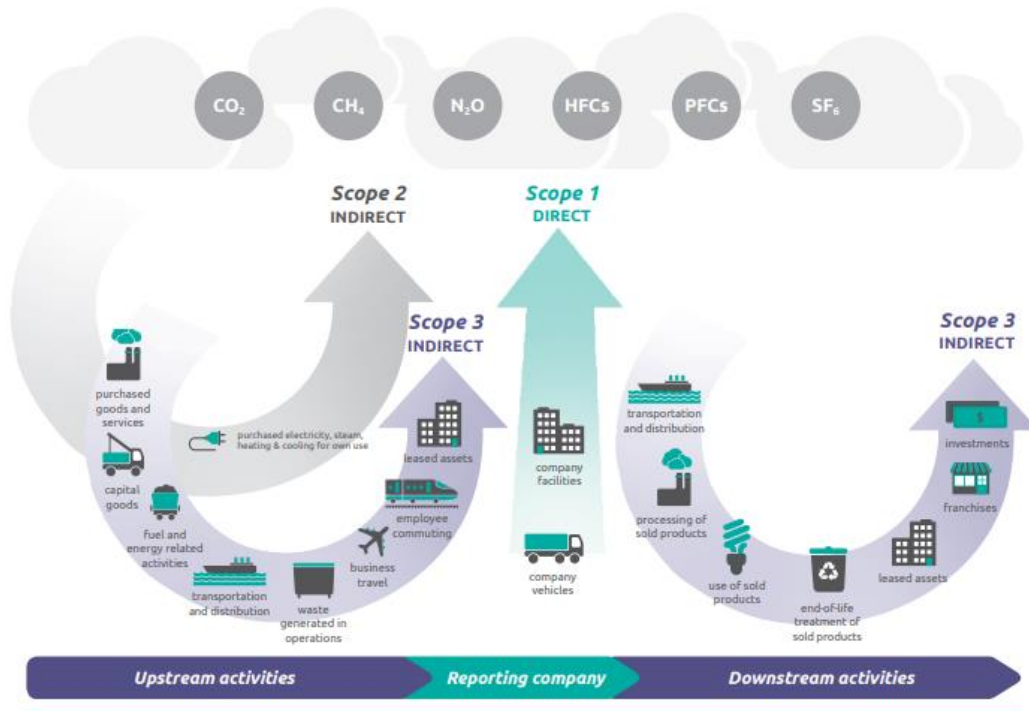
Carbon Accounting – Difficulties in Quantifying Exposures at a Corporate Level

The separation of Greenhouse Gas (GHG) emissions into its three scopes, defined by the GHG Protocol’s ‘Corporate Standard’, is now a standard approach in Carbon Accounting. Direct emissions from companies that own or control sources (Scope 1) and emissions from purchased electricity (Scope 2) form part of the standard disclosures for many listed companies, and are mandatory under multiple international reporting standards. The TCFD, GRI and SASB (industry dependent) all recommend disclosure of Scope 1 and 2 emissions data and include mature methodologies for the calculation of these metrics.

⁷ [JLL-the-commercial-case-for-making-buildings-more-sustainable-nov-2023.pdf](#)

⁸ [The Business Case for Energy-Efficient Buildings | ENERGY STAR](#)

Figure 2: Overview of GHG Protocol Scope and emissions across the value chain



Source: GHG Protocol, 2013⁹

Scope 3 emissions represent all other indirect emissions in a company’s value chain, either upstream from purchased goods and services or downstream from goods and services sold. Disclosures relating to Scope 3 require far more complex methodologies across a company’s entire value chain. And yet it is these emissions that often represent, on average, the largest portion of a company’s GHG exposure. Companies across industries are starting to include these disclosures in their own reporting frameworks. The CDP reports that in 2022 over 90% of emissions disclosed by its European members were Scope 3¹⁰.

Scope 3 Factors in the Listed Real Estate Sector

The Real Estate sector is no different. According to non-profit organisation Architecture 2030, real estate accounts for 42% of annual global emissions. In quantifying their own contributions to this total emissions figure, listed real estate companies face a similar problem to many financials: the bulk of their exposure comes not directly from their own activities but from the emissions associated with their portfolios. This exposure largely comprises two Scope 3 activities; tenant emissions and embodied carbon.

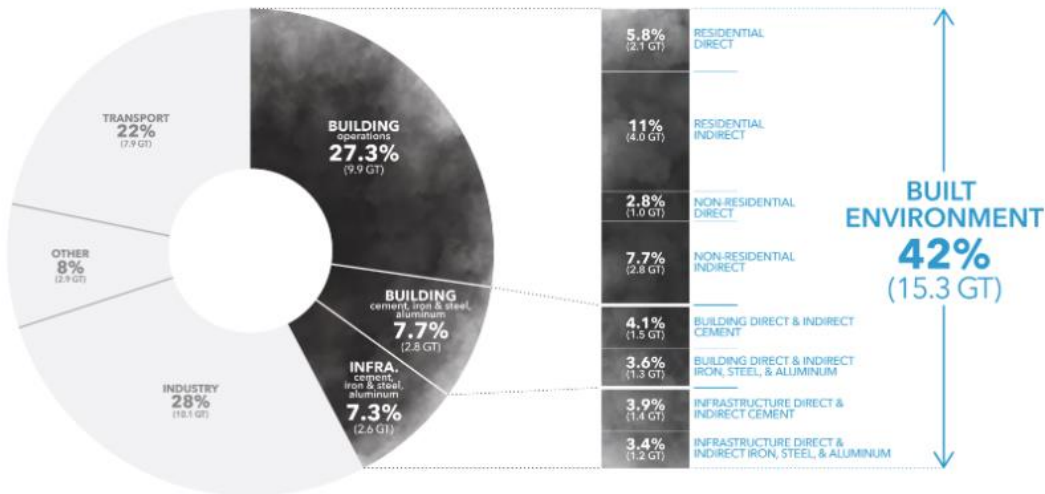
- Tenant emissions are those generated by tenants in a leased property. Tenant emissions can be significant, particularly in commercial real estate, as they encompass the energy consumption and other activities of businesses or individuals renting space within a building.
- Embodied emissions are those associated with the entire lifecycle of a product or material, from extraction and processing of the raw materials used in construction to construction itself, maintenance, and disposal. These emissions are ‘embodied’ in the materials and products used in construction, representing the total carbon footprint of these materials throughout their life cycle.

⁹ [Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf \(ghgprotocol.org\)](https://www.ghgprotocol.org/corporate-value-chain-accounting-reporting-standard-041613-2.pdf)

¹⁰ [Only 37% of Scope 3 emissions from European businesses are addressed by corporate decarbonization measures – CDP](https://www.cdp.com/en/2022/only-37-of-scope-3-emissions-from-european-businesses-are-addressed-by-corporate-decarbonization-measures)

The below figure from Architecture 2030 breaks down the total carbon footprint into its components.

Figure 3: Total Annual Global CO2 Emissions with Built Environment Breakdown: direct and indirect energy and process emissions (36.3GT)



© Architecture 2030. All Rights Reserved.
 Analysis & Aggregation by Architecture 2030 using data sources from IEA & Statista.

Source: Architecture 2030¹¹

Twenty-seven percent of the total derives from building operations, which can either be direct from asset owners (9% of the total) or indirect from tenant emissions (18% of the total). The other 15% comes from construction activities as embodied carbon¹¹. Much of the embodied carbon exposure comes from the creation of raw materials, cement, iron, steel and aluminium purchased in building construction, although factors like construction, transportation and end-of-life emissions also contribute to this total. Combined, these two factors represent a significant exposure to listed real estate. In total, for the largest 200 listed real estate companies globally identified by Robeco, these Scope 3 emissions amount to an average 86% of total emissions where disclosed¹².

¹¹ [Why The Built Environment – Architecture 2030](#)

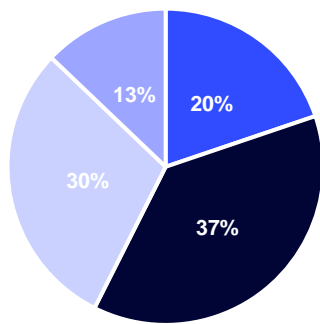
¹² [Scope 3 emissions in real estate: The elephant in the room | Robeco UK](#)

Section 2: Assessment of Disclosures in the EPRA Nareit Universe

The following section will investigate how companies in the FTSE EPRA Nareit Developed universe are currently disclosing emissions, focusing on the areas of Scope 3 disclosure discussed above. The sample data for this study was taken from a global sample of 40 of the largest companies in the EPRA Nareit global universe, representing over 50% of the FTSE EPRA Nareit Developed Index weight. The companies were selected to provide representation across different regions and sectors – ensuring that all regions and sectors are included – while maintaining the large cap focus.

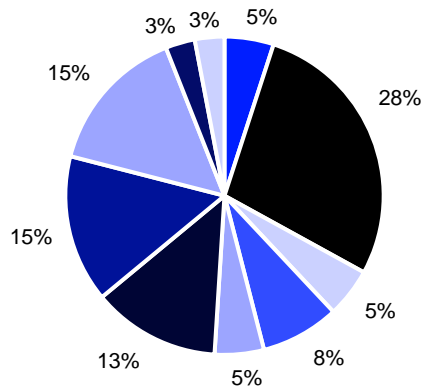
Figure 4: Sample Attributions by Region and Sector

Companies Sampled by Region



- Europe
- North America
- APAC ex Japan
- Japan

Companies Sampled by Sector



- Data Centers
- Diversified
- Health Care
- Industrial
- Mixed
- Office
- Residential
- Retail
- Self Storage
- Speciality

Source: FTSE Russell, public disclosures taken as of June 2024

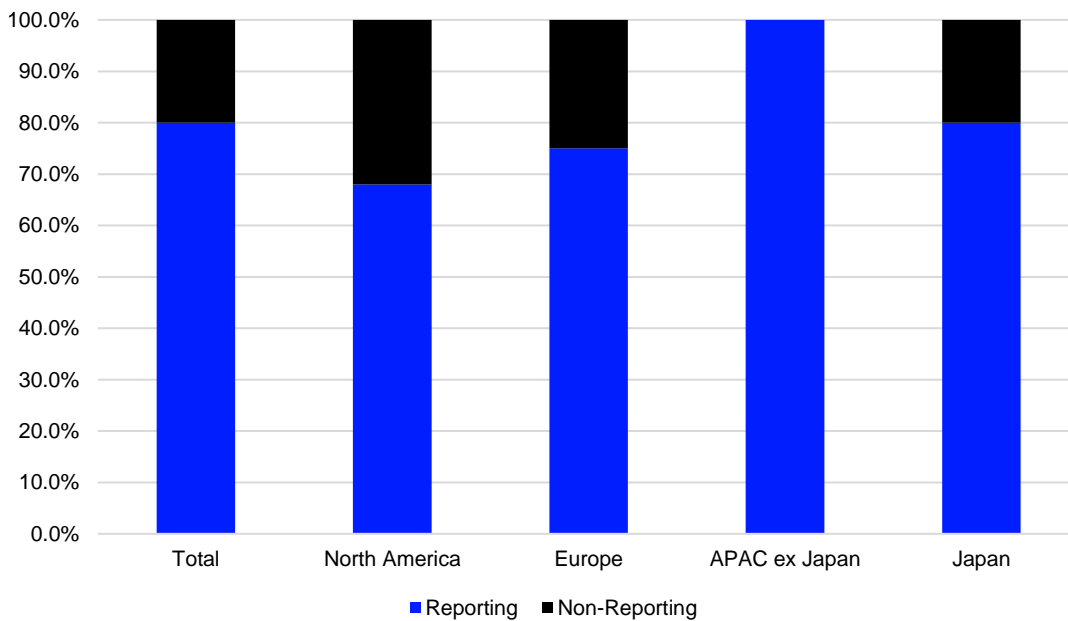
Data was collected from these companies' annual reports, ESG/Sustainability reports and directly from company websites on the quality of emissions disclosures, tenant and embodied carbon disclosures, and alignment to reporting standards. All subsequent graphs in this section reflect outcomes from this sample. Note that as the sample consisted of the largest constituents in each sector and region, one would expect to see, on average, better quality disclosures given the increased resources, investor pressure and regulatory obligations for these companies.

Carbon Emissions Disclosure and Tenant Emissions

At a basic level, almost every company disclosed their carbon emissions, with 98% reporting metrics relating to emissions exposure. Among companies in the sample, there was heterogeneity in levels of disclosure. This came in the uniformity of metrics used to disclose, the scopes covered in disclosures, inclusions of pertinent embodied carbon categories in scope 3 disclosures and the classification of tenant emissions within the disclosure framework.

Looking first at the metrics used to disclose, the most prevalent metric used was total emissions, accompanied by an intensity metric for all or a subset of total emissions per Gross Floor Area (GFA). However, more than eight separate primary¹³ metrics in total were listed across the sample, with differing preferences across regions. In the US, the most common metric used was metric tons CO₂e per square foot (MtCO₂e/sf), whereas in Japan and Europe kilograms and metres squared were more prevalent. While difficult to compare directly, these metrics are comparable once scaled. Other metrics seen, such as total emissions without an accompanying GFA disclosure and emissions per revenue, were not. In total, 10% of the sample did not disclose sufficient levels of information to produce a comparable emissions metric in the form of total emissions per floorspace. Figure 5 shows proportions of companies directly disclosing comparable emissions metrics by region.

Figure 5: Percentage Companies Reporting Comparable Scope 1+2 Carbon Intensity Figures



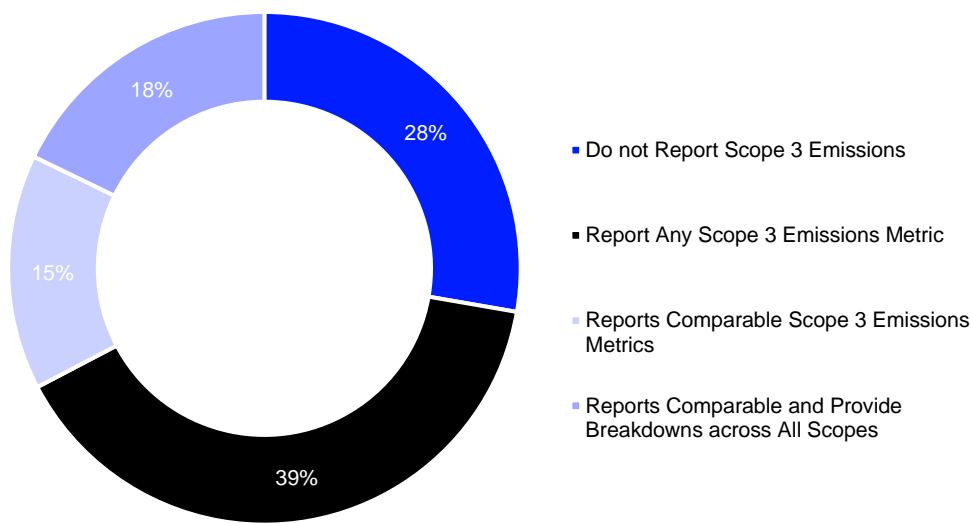
Source: FTSE Russell, public disclosures taken as of June 2024

¹³ A primary metric here is one referred to in the main body of the annual report

Although the above metrics are loosely comparable, this is only in terms of the units used and how the metrics are used in public disclosures. To provide truly comparable metrics, disclosures should be taking into account the same scopes, and factors within scopes. In the last section, the importance of Scope 3 emissions factors was discussed. When focusing on these factors, we again see heterogeneity in the depth and quality of disclosures.

Figure 6 breaks down the levels of Scope 3 disclosures in the sample. Most companies report Scope 3 emissions data in some format, with just 17.5% disclosing no Scope 3 metrics at all. Many companies disclose Scope 3 separately to their intensity metric, which includes just Scope 1 and Scope 2 exposure. Only 32.5% included Scope 3 emissions in their reported intensity metrics, and among those roughly half did not break down their Scope 3 figures into their constituent factors¹⁴.

Figure 6: Breakdown of Scope 3 Reporting Standards

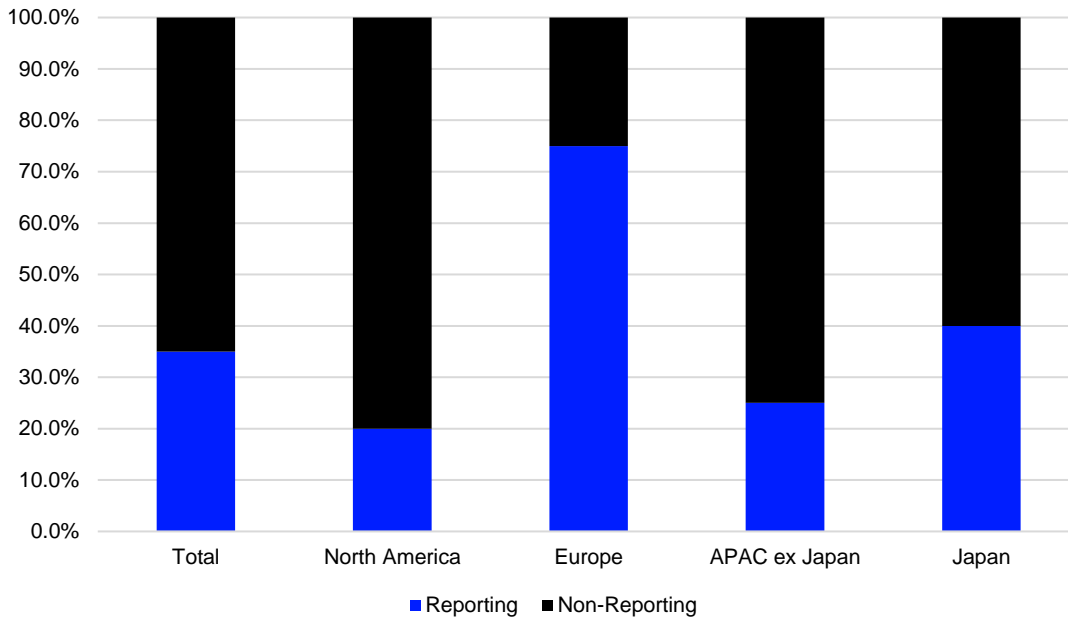


Source: FTSE Russell, public disclosures taken as of June 2024

¹⁴ In total, 30% of constituents broke down their emissions scopes into their constituent factors however, just 18% of these also provided Scope 3 data in a format that allowed its inclusion in emissions intensities metrics.

Looking at the regional variation in reporting standards, shown in figure 7, Europe performs best with 75% of companies reporting Scope 3 emissions intensity.

Figure 7: Percentage Companies Reporting Comparable Scope 3 Carbon Intensity Figures



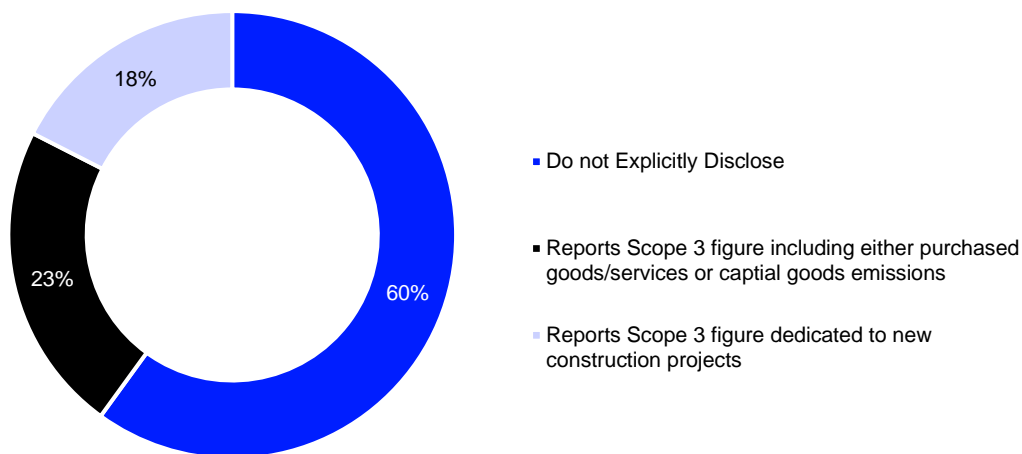
Source: FTSE Russell, public disclosures taken as of June 2024

Another issue relates to how companies define their tenant emissions in their reporting. Within building operations there are both landlord and tenant components; for example, purchased electricity used in communal areas should fall under Scope 2, while electricity used in tenant areas should be classified as downstream Scope 3 emissions. However, in disclosures all building operations or 'location-based' portfolio emissions are often included in the Scope 1+2 intensity figures. While this means that figure 6 under-reports the number of companies including tenant emissions in their disclosures, it further complicates the issue of comparable reporting, especially where meta data around disclosures are not explicit on factors contributing to each Scope's emissions figures.

Embodied Carbon Disclosures

Embodied carbon is still a nascent topic of disclosure, although it is gaining increasing attention. In their latest annual results, the Global Real Estate Engagement Network (GREEN) found a 13% uptick in Life Cycle Assessments (LCAs)¹⁵ completed over the previous year, albeit to just 31% of participants¹⁶. Figure 8 breaks down how different companies in the EPRA Nareit sample addressed these disclosures:

Figure 8: Embodied Carbon Reporting Distribution



Source: FTSE Russell, public disclosures taken as of June 2024

Assessing Embodied Carbon disclosures is often difficult. Many companies do not separate out their Scope 3 disclosures - or include categories referencing embodied carbon. Where defined, a common Scope 3 disclosure methodology breaks down emissions according to the 15 classifications laid out by the GHG Protocol. Within these embodied carbon could be linked to multiple categories:

- Category 1 – Purchased Goods and Services
- Category 2 – Capital Goods and Services
- Category 12 – End-of-Life Treatment of Sold Products

Categories 1 and 2 are those most commonly associated with embodied carbon in disclosures, although which of them is used varies between companies. These categories are associated with emissions from materials purchased during construction. Category 12 disclosures are less common, and relate to the emissions required in the disposal of assets as part of the building life cycle. A common issue encountered with this methodology is that, although companies would include some emissions disclosures under these categories, the magnitude of figures disclosed would often suggest that full portfolio embodied carbon assessments had not been carried out when comparing to peers explicitly disclosing these. Thus, the figure of 23% in figure 8 likely overstates embodied carbon disclosures. Again, a lack of meta information on disclosures made verifying the extent of this issue difficult.

Another methodology commonly used is to disclose emissions relating to development projects or construction. Often these figures are disclosed separately to other emissions disclosures. A key downside of this methodology is that it doesn't account for any of the embodied carbon already reflected in a company's existing portfolio, or acquisition's that do not require development. Nonetheless, it is well defined and arguably the easiest method of tracking embodied carbon exposures on an ongoing basis,

¹⁵ Although not exactly equivalent, LCAs and embodied carbon assessments of existing portfolios are often used interchangeably

¹⁶ [GREEN engagement results 2023.pdf \(green-engagement.org\)](https://www.green-engagement.org/green-engagement-results-2023.pdf)

as performing embodied carbon assessments on existing assets can be difficult, absent consensus on methodologies.

Emissions Reporting Case Study – Wharf Real Estate and Mitsubishi Estate

Wharf Real Estate Investment and Mitsubishi Estate are two real estate investment companies, based in Singapore and Japan respectively. The below table summarises their latest emissions disclosures, taken from their annual and sustainability reports. The two companies own diversified asset portfolios, Wharf across Retail and Residential sectors and Mitsubishi spanning offices, retail, residential, logistics and others.

Table 1: Annual Emissions Disclosures from Wharf Real Estate and Mitsubishi Estate

Latest Annual Report Company Emissions Figures (tCO ₂ e)		
Company name	Wharf Real Estate Investment	Mitsubishi Estate
Scope 1 total	7,836	110,783
Scope 2 total	96,080	154,659
Market-based	96,080	Not disclosed
Location-based	139,769	Not disclosed
Scope 3 total	904	1,833,828
Category 1: Purchased goods and services	660	297,717
Category 2: Capital goods	Not disclosed	834,773
Category 3: Fuel- and energy- related activities	Not disclosed	86,226
Category 5: Waste generated in operations	238	27,167
Category 6: Business travel	Not disclosed	1,390
Category 7: Employee Commuting	Not disclosed	3,099
Category 11: Use of sold products	Not disclosed	439,701
Category 12: End-of-Life Treatment of Sold Products	Not disclosed	44,083
Category 13: Downstream Leased Assets	Not disclosed	99,673
Category 14: Franchises	6	Not disclosed
Floorspace (m²)	Not disclosed	8,052,059
Carbon intensity (tCO₂e per m²)	0.092*	0.261

* Wharf Real Estate Investment's intensity was not directly disclosed, estimated here using approximate floorspace figure of 12.3m square feet referenced in annual report text

Figure sources: Latest available annual reports for Wharf Real Estate Investment (2023, [Sustainability Reports | Wharf REIC](#)) and Mitsubishi Estate (2022, [MITSUBISHI ESTATE GROUP Sustainability report 2023 \(disclosure.site\)](#))

Both companies disclose emissions across all three Scopes, feasibly including both embodied and tenant emissions (for Wharf, these are captured under the 'Location-based' Scope 2 metrics). Mitsubishi's portfolio is roughly eight times the size of Wharf's, meaning that the 'total emissions' figures disclosed by each are not directly comparable however, figures normalised by floorspace are given at the end of the table.

It is hard to estimate the relative size of the two companies tenant emissions, as Wharf's reporting discloses them under Scope 2 purchased emissions in combination with their own under location-based emissions. However, by combining the sums of Mitsubishi's Scope 1 and 2 emissions with Scope 3 Categories 11 and 13, one can produce roughly comparable figures. Doing so yields intensities per

floorspace of 0.122 for Wharf and 0.100 for Mitsubishi, suggesting that based only on these categories Wharf is slightly more carbon intensive. Another caveat here is that Mitsubishi do not state whether their scope 2 emissions are market-based or location-based, so taking the location-based figure for Wharf here may produce a slightly inaccurate comparison.

Then, focusing on embodied carbon disclosures, we see a large difference between the two companies' disclosures. Both disclose Scope 3 Category 1 emissions, but it is likely that most of Wharf's exposure is not reported – and neither is their category 2 exposure. For this reporting, it is impossible to know from Wharf's disclosures what portion of embodied carbon emissions they are capturing, if any. Mitsubishi on the other hand discloses a large embodied emissions exposure, over 1 million tons under categories 1 and 2. The result of these differences is a large discrepancy between the reported full Scope emissions intensities of the two companies, with Mitsubishi's being almost three times higher despite tenant emissions alone suggesting an inverse relationship.

It is clear from this case study that it is often difficult to derive an apples-for-apples carbon intensity from reported figures and those companies most comprehensively disclosing can end up appearing more intensive as a result. In this case, just looking at scope 1+2 intensities would omit Mitsubishi's tenant exposures, while looking at all three wouldn't account for Wharf's lack of disclosure on embodied carbon.

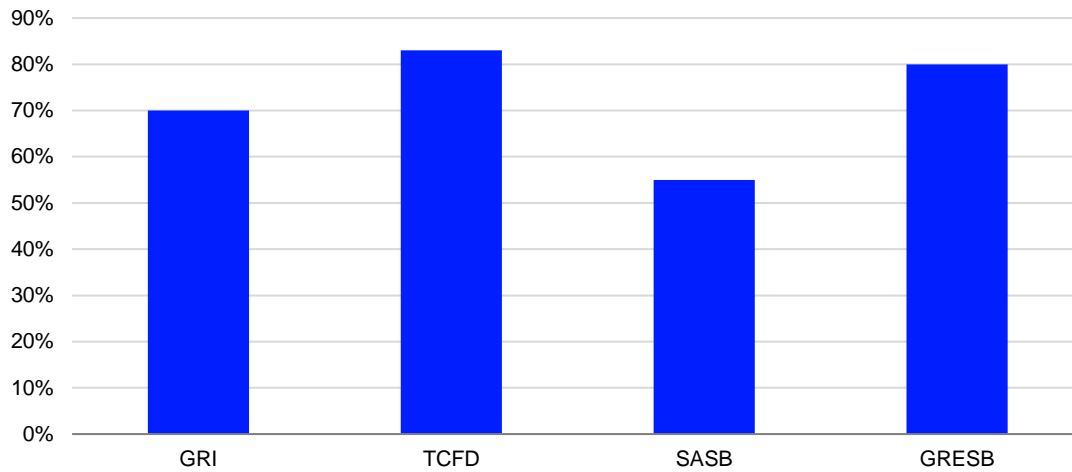
Reporting Standards and Carbon Disclosures

Imposing reporting frameworks and standards is a good way to ensure that companies disclosures are standardised and include all the required elements to give an accurate representation of their climate exposures. Among the sample, three voluntary international disclosure frameworks were frequently seen in annual reports, the Global Reporting Initiative (GRI), the Task Force on Climate-Related Financial Disclosures (TCFD) and the Sustainability Accounting Standards Board (SASB). All three have requirements on carbon emissions disclosures, summarised as follows:

- GRI provides a comprehensive framework for sustainability reporting that covers a wide range of environmental, social, and governance (ESG) issues. Section 'GRI 305: Emissions' requires disclosure of emissions, including Scope 1, 2 and 3 emissions.
- TCFD provides a framework for disclosing climate-related financial risks and opportunities, aiming to improve and increase the reporting of climate-related information. TCFD encourages reporting on Scope 1 and 2 emissions and recommends that companies disclose Scope 3 emissions where they form a significant portion of their overall emissions.
- SASB develops industry-specific standards to help companies disclose financially material sustainability information to investors. Their industry-specific standards include requirements for reporting on emissions and other climate-related metrics.

Currently, none of these standards directly requires disclosures on tenant or embodied emissions. But many companies in the sample also commit to the GRESB real estate benchmark, which obligates submissions on ESG data, including tenant emissions. The percentage of participants adhering to each standard are given in figure 9.

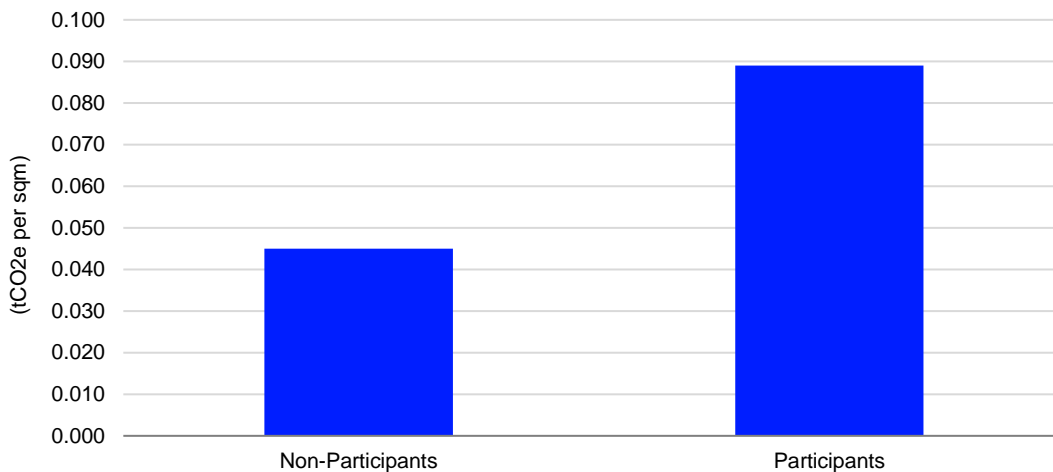
Figure 9: Participation rates in reporting frameworks



Source: FTSE Russell, public disclosures taken as of June 2024

The TCFD and real estate-specific standards GRESB have the highest participation rates in the sample, although participation for all four was greater than 50%. Considering how alignment to these standards affects carbon disclosure, figure 10 shows the average reported emissions intensities of those companies committing to GRESB disclosures, versus those of non-participants.

Figure 10: Average emissions intensities of GRESB participants versus non-participants



Source: FTSE Russell, public disclosures taken as of June 2024

Initially this graph may seem confusing, as one would expect companies committed to higher standards of ESG disclosures also to have better climate practices more broadly, and so to have lower carbon intensities on average. But the graph indicates that the carbon intensity of GRESB participants is almost double that of their non-participating counterparts. This makes sense, though, when you consider that those companies committing to higher disclosure standards are more likely to include factors like tenant emissions and embodied carbon, excluded by those companies not committing to any standards. Similar results are obtained across all four standards, with participants having higher average emissions than non-participants. This demonstrates the benefits reporting standards enforcement to ensure companies' disclosures are accurate and complete.

Section 3: Measurabl Data Spotlight – A Comparative Analysis to Public Disclosures

In the previous section we saw the consistency issues that currently affect the quality of reported emissions data. This section will examine the differences between Measurabl’s estimated emissions data and reported values from 2022 company disclosures. The comparison will look at two sets of data from Measurabl:

- Data tracked in Measurabl’s ESG management system (AAMD): the dataset comprises the utility data directly collected from Measurabl’s reporting client base, aggregated and anonymised. This data is collected for the same 12-month period throughout 2022.
- The 2022 energy and carbon estimates produced by [Measurabl’s Whole Building Estimates Methodology](#) (WBE): the estimates produced by this machine learning model are derived from a specifically selected subset of training data from the AAMD dataset. Further information on how the WBE dataset is selected - and the machine learning model overlay, can be found in Appendix A.

For the purposes of this comparison, a sample of 33 companies was taken within the FTSE EPRA Nareit Developed Index, for which Measurabl also tracks energy consumption and derived carbon emissions data. These companies were then screened on the basis of outlying energy use intensity values, differing portfolio coverage across public disclosures and the two Measurabl datasets, and for balanced regional representation. The resulting final sample includes 25 companies, all North America-domiciled, representing 16.6% index weight.

Figure 11: Sample characteristics of companies selected for comparison

FTSE EPRA NAREIT Dev Index						
Companies				Market Cap	Index	
(#)				(millions)**	Weighting	
363				1,660,001.88	100%	

Sample of North America Constituents						
Property Type	Companies	%	Gross Floor Area (sf)*	Properties (#)*	Market Cap (millions)**	Index Weighting
	(#)					
Diversified	4	16.0%	100,391,000	984	15,659.42	1.04%
Healthcare	3	12.0%	73,658,681	874	4,757.63	0.32%
Industrial	2	8.0%	16,000,000	842	12,104.80	0.80%
Leisure	1	4.0%	122,000,000	55	27,054.33	1.82%
Office	3	12.0%	110,800,000	1,114	16,166.13	1.09%
Residential	5	20.0%	303,566,611	1,417	73,058.53	4.89%
Retail	5	20.0%	319,295,740	12,797	53,181.51	3.55%
Self-Storage	2	8.0%	275,800,000	3,970	50,923.24	3.06%
	25	100.0%	1,321,512,032	22,053	252,905.60	16.57%

Sample Coverage	6.89%	15.24%	16.57%
-----------------	-------	--------	--------

* Mkt Cap and Index Weightings as of June 2024

** Mkt Cap Base Currency (EUR) before Investability Weight

* GFA and # of properties are based on public disclosures. GFA excludes a total of 110,063 reported units with unknown sf/m2.

Source: Measurabl AAMD and WBE Data, 2022 public disclosures

Findings on Differences in Absolute Energy and Carbon

Initial findings indicate that, on average, public disclosure energy and carbon values are significantly higher than the AAMD values, and significantly lower than those produced by the WBE model (see carbon emissions and energy consumption metrics in figure 12). Thus, the AAMD values are the lowest of the three sets of data. This is due in great part to the floor area covered by each property, in the AAMD measured energy data. Not all companies within the sample are tracking energy data for 100% of their assets or building spaces within the Measurabl system. In fact, the weighted average GFA with corresponding energy data is 61.62% of total company GFA. This means that under the AAMD approach, 38.38% of GFA is unaccounted for in the energy consumption values.

Figure 12: Sample Carbon and Energy Outcomes Across Methodologies – GFA unadjusted

Values	Gross Floor Area (GFA) (sf)		Carbon Emissions			Energy Consumption		
	Aggregate	Median	Absolute (MTCO ₂ e)	Average intensity (kgCO ₂)	Median intensity (kgCO ₂)	Absolute (MWh)	Average intensity (kWh)	Median intensity (kWh)
Public Disclosures	1,321,512,032	43,069,898	5,505,135	4.17	4.31	17,483,968	13.23	11.27
Aggregated, Anonymized, Measured Data in Measurabl (AAMD)	1,468,219,911	36,509,666	3,102,353	2.11	1.72	12,079,101	8.23	8.20
Measurabl's Whole Building Estimates (WBE)	1,650,276,637	43,211,187	7,103,874	4.30	4.65	26,077,049	15.80	17.84
Differences								
Public Disclosure values are on average X% than AAMD	-9.99%	17.97%	77.45%	97.15%	150.54%	44.75%	60.81%	37.48%
AAMD values in Measurabl are on average X% than Measurabl's WBE	-11.03%	-15.51%	-56.33%	-50.91%	-62.98%	-53.68%	-47.94%	-54.04%
Public Disclosures are on average X% than Measurabl's WBE	-19.92%	-0.33%	-22.51%	-3.23%	-7.26%	-32.95%	-16.27%	-36.82%

Source: Measurabl AAMD and WBE Data, 2022 public disclosures

To adjust the energy and carbon values under the AAMD approach to reflect where they might be if utility meters were assigned to 100% GFA and full energy consumption was known, an extrapolation was made by dividing the AAMD absolute energy and carbon values by the 61.62% GFA they represent. This resulted in adjusted AAMD values lining up better with public disclosures, with absolute energy consumption per public disclosures 10.81% lower than adjusted AAMD values and absolute carbon 9.34% higher.

Figure 13: Sample Carbon and Energy Outcomes Across Methodologies – GFA Adjusted

Gross Floor Area Coverage Extrapolation	Gross Floor Area Coverage	Gross Floor Area (GFA) (sf)		Adjusted Carbon Emissions			Adjusted Energy Consumption		
	Weighted Average GFA with Energy Data	Total	Attributed with Energy Data	Absolute (MTCO ₂ e)	Average intensity (kgCO ₂)	Median intensity (kgCO ₂)	Absolute (MWh)	Average intensity (kWh)	Median intensity (kWh)
Aggregated, Anonymized, Measured Data in Measurabl	61.62%	1,468,219,911	904,713,468	5,034,673	3.43	2.86	19,602,644	13.35	16.03
Adjusted Values									
Public Disclosures				5,505,135	4.17	4.31	17,483,968	13.23	11.27
Aggregated, Anonymized, Measured Data in Measurabl				5,034,673	3.43	2.86	19,602,644	13.35	16.03
Measurabl's Whole Building Estimates				7,103,874	4.30	4.65	26,077,049	15.80	17.84

Gross Floor Area Coverage Extrapolation	Gross Floor Area Coverage	Gross Floor Area (GFA) (sf)	Adjusted Carbon Emissions			Adjusted Energy Consumption			
	Weighted Average GFA with Energy Data	Total	Attributed with Energy Data	Absolute (MTCOe2)	Average intensity (kgCO2)	Median intensity (kgCO2)	Absolute (MWH)	Average intensity (kWh)	Median intensity (kWh)
Adjusted Differences									
Public Disclosure values are on average X% than AAMD				9.34%	21.48%	50.76%	-10.81%	-0.91%	-29.69%
AAMD values in Measurabl are on average X% than Measurabl's WBE				-29.13%	-20.34%	-38.49%	-24.83%	-15.51%	-10.14%
Public Disclosures are on average X% than Measurabl's WBE				-22.51%	-3.23%	-7.26%	-32.95%	-16.27%	-36.82%

Source: Measurabl AAMD and WBE Data, 2022 public disclosures

The limitation of such simple extrapolation is that it assumes an even distribution of energy consumption across an entire asset when in fact the missing energy meters are more likely to be attributed to tenant spaces with a different use and consumption profile.

With a more comparable basis in place for AAMD and public disclosure values, we now look to Measurabl's WBE approach. At first glance it appears that these values are overestimating absolute energy and carbon. After all, public disclosure and adjusted AAMD values are 22.51% and 29.13% lower, respectively. However, public disclosures indicate that only 36% of the companies in the sample (nine of 25) are disclosing Scope 3 tenant emissions. Further, full Scope 3 operational carbon (i.e., tenant emissions) are not reported by any of those nine companies, as some indicate that they report on the European subset of their portfolios only.

As mentioned in Section 1, Scope 3 tenant emissions can comprise the majority of energy consumption and derived carbon for some assets, especially those with triple net lease structures common in single-tenant leased properties where the tenant is responsible for paying the real estate utilities. Therefore, the higher whole building energy and carbon estimates, which by definition account for full Scope 3 operational carbon and tenant energy consumption, are to be expected as they account for full portfolio tenant emissions. Likewise, the relative alignment of energy and carbon between the adjusted AAMD and public disclosure approaches, is also expected as it's likely that companies would be tracking the portion of their emissions they are also disclosing.

Another factor affecting estimates is that Measurabl's WBE also assumes 100% occupancy in order to capture the full risk potential of an asset's/company's operations and produce comparable estimates in lieu of known current occupancies.

Factors Affecting Energy and Carbon Intensities

Intensities are more challenging to reconcile across the three approaches. In this case, GFA (sf) was used as the denominator and GFA varies widely depending on the source. A few of the most obvious reasons for this are outlined below:

- **Inconsistent units of measurement** – public disclosures often account for certain types of assets and spaces in units (as opposed to sf/m2). This is common among multi-family residential, student housing, senior care facilities and self-storage assets. Converting units to GFA is impossible without, at minimum, an average GFA size per unit – and this is often missing.
 - Three of the 25 companies in the sample report 0 GFA across a total of 110,063 units, resulting in lower intensities per the public disclosure approach. If, for example, an average of 700sf per unit is assumed, 77 million sf would be added to publicly disclosed GFA.

- Limited disclosure of assets and asset locations – while some companies provide the geographic location of all their assets, others do not, or do so on a more limited basis – e.g., regional roll-ups that express aggregate GFA in a particular region or city but do not disclose the number of assets to which that aggregate GFA applies or their exact location.
 - Measurabl’s WBE approach requires that both the number of assets and their geolocation (property address or latitude/longitude) be known in order to precisely geolocate and model the energy and carbon for each asset prior to aggregating up to the company level.
 - When GFA is not publicly available, Measurabl [estimates floor area](#) in order to derive the inputs necessary for its WBE model.
 - When the number of individual assets is not disclosed, Measurabl estimates the aggregate floor area reported vs. a per-building estimate.
 - When asset location is undisclosed, Measurabl substitutes with actual median energy use intensities (EUI) and carbon intensities (CI) in its underlying dataset. These benchmarks are based on actual or measured data and are specific to the combination of property type and general location, e.g., office in UK or retail in Florida.
- Divergent reporting boundaries and calculation methods – as discussed in Section 2, it is clear that reporting boundaries and methods of calculation vary widely across the public disclosures of real estate companies, further contributing to the observed differences.

Based on the above, if public disclosures included all assets in reported GFA (vs. units), the energy and carbon intensities would be even lower than currently reported. The limited reporting of GFA along with limited disclosure of asset count and location results in the need in some instances to estimate floor area. Given that aggregate GFA per public disclosure is 20% lower than Measurabl’s WBE approach, floor area estimates may be overshooting. If so, a correction would result in even higher energy and carbon intensities per the Measurabl WBE approach, which includes full Scope 3 tenant emissions missing from the other two approaches and supporting the conclusion that energy and carbon intensities are likely underreported via public disclosure.

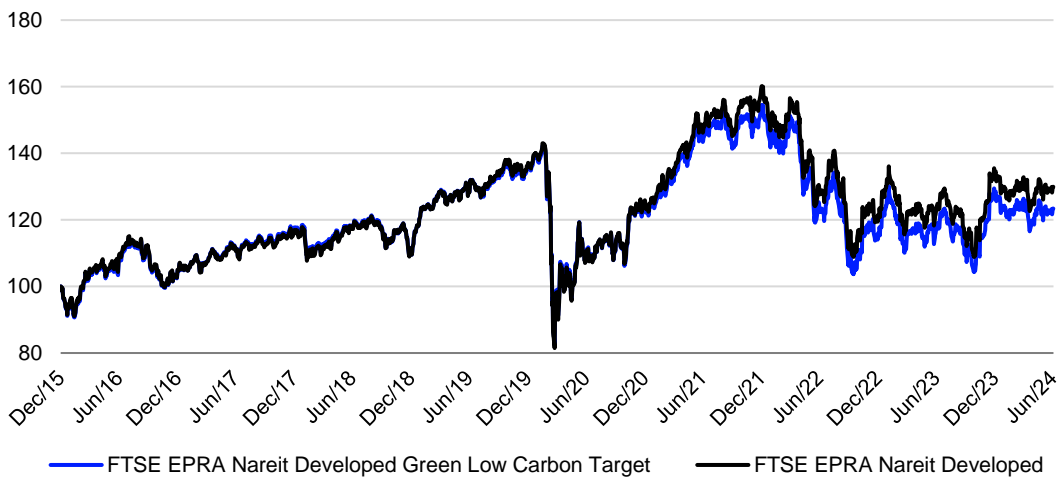
Measurabl’s WBE data currently do not include estimates for embodied carbon emissions. As seen in Section 2, methodologies and underlying data disclosures required for the estimation of these figures are still nascent, with large variations across the index universe; this limits the current value from including estimations of this data. Until more transparent and standardised disclosure is a reality, assessing the comparative performance of real estate companies on the basis of sustainability metrics will prove challenging. While no proxy is perfect, Measurabl’s whole building energy and carbon estimates apply a consistent and comparable methodology across property companies with widely divergent disclosure practices. Measurabl and FTSE Russell will continue to partner to ensure that methodologies driving index metrics are reflective of current best practices.

Section 4: Investing in green real estate through FTSE EPRA Nareit Green indices

FTSE Russell has a wide range of Sustainable Investment Indices, incorporating carbon emissions, energy intensity and green certification metrics overlays on the FTSE EPRA Nareit Index Series. The green and green focus indices utilise a fixed tilt methodology to give clear translations from sustainable data inputs to index outcomes; the green target and green low carbon target indices on the other hand use target exposure methodologies to guarantee specific outcomes at a portfolio level. All indices utilise the Measurabl WBE data discussed in Section 3, offering comparable assessments across the entire EPRA Nareit universe of climate metrics.

Throughout the index's history, the performance of the FTSE EPRA Nareit Developed Low Carbon Target Index has been close to that of the parent EPRA Nareit Developed index, the index tracked very closely for the period from 2015 to 2020. However, since the Covid-19 pandemic the index has underperformed its parent benchmark, -6.3% over the subsequent four years to 28 June 2024.

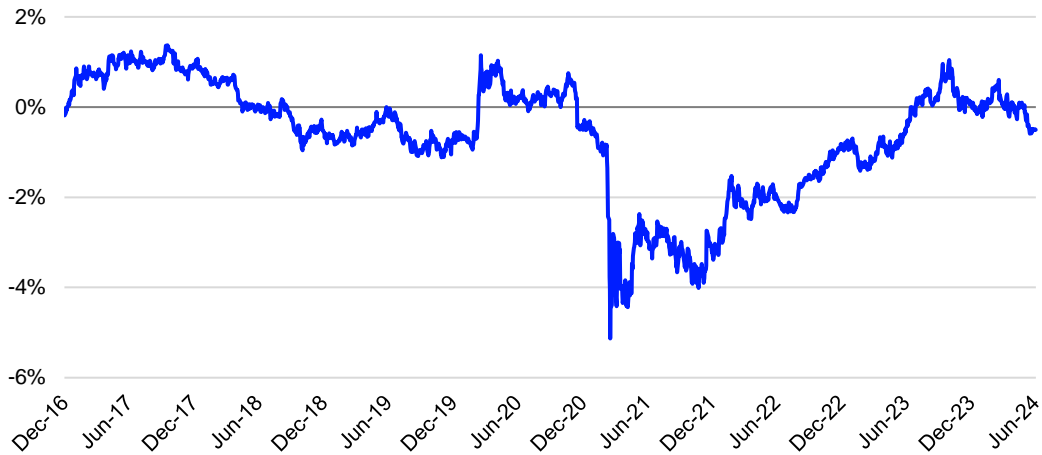
Figure 14: Performance of FTSE EPRA Nareit Developed Green Low Carbon Target Index vs Parent Benchmark (TR, USD)



Source: FTSE Russell index data taken as of June 2024

This underperformance by the index was relatively isolated to the post-COVID recovery period (having slightly outperformed in the initial Covid period) from late 2020 through 2021. From 2022 onwards the performance has returned to closely tracking the performance of the parent benchmark.

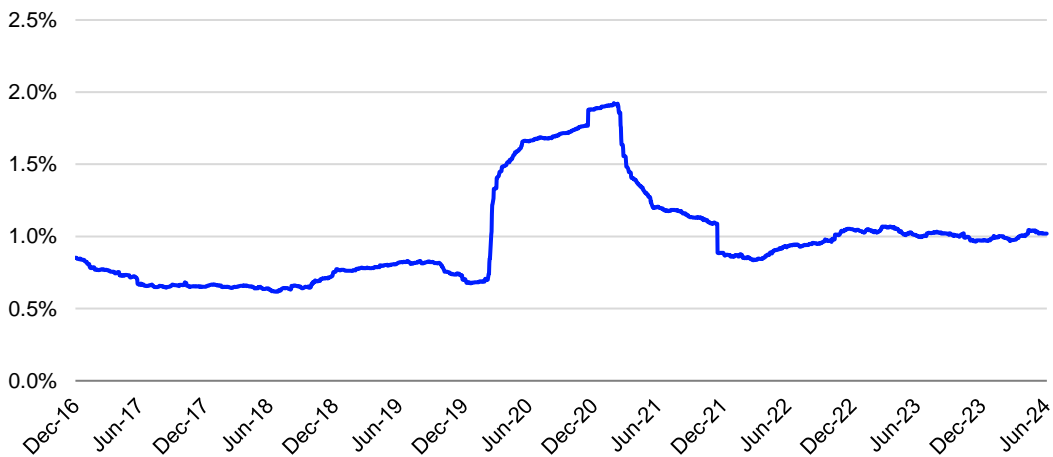
Figure 15: Rolling 12m Relative Performance (TR, USD)



Source: FTSE Russell index data taken as of June 2024

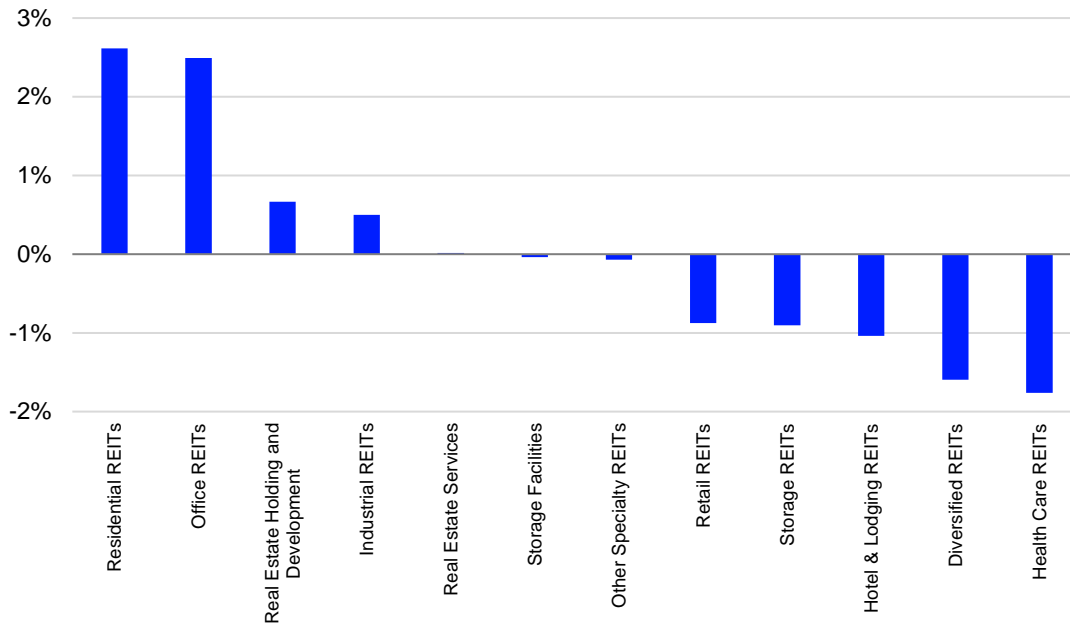
Analysis of rolling tracking error shows that it rose sharply, from a relatively stable 0.7-0.8% to almost 2.0%. However, since the performance has recovered the tracking error has also fallen, remaining stable at a level of ~1.0%. This is a relatively low tracking error when compared to other SI equity indices of ~1.6-2.5% (see [Sustainable Investment Insights - July 2024 | LSEG](#) for comparison).

Figure 16: Rolling 12m Tracking Error



Source: FTSE Russell index data taken as of June 2024

Figure 17: Active weights by ICB subsector (28 June 2024)



Source: FTSE Russell index data taken as of June 2024

The reasons for this underperformance becomes clearer when looking at the active weights by sub-sector. The largest overweights (albeit still a relatively small at 2.5% and 2.6%) are the residential REIT and office REIT sub-sectors. The changes to the office environment in the post Covid hybrid working model acted as a drag on performance but performance in these sectors now appears to have stabilised. Going forward, we would hope that the green premiums and transition risks identified in Section 1 will be strong performance drivers for the index, and for the series as a whole.

Section 5: Index Works – Calibration for an Evolving Asset Class

When assessing the performance of the FTSE EPRA Nareit Developed Low Carbon Target Index, the sustainability objectives and methodology should be accounted for alongside tracking error. Active weights discussed in the previous section are an outcome of the index rebalance process, where FTSE Russell's Target Exposure methodology adjusts weights on a stock level to ensure the overall index targets are met. These sustainability targets are combined with restrictions of maximum deviation at the sector and country level, in addition to maximum deviation on benchmark weight.

These constraints dictate the maximum over- or under-weighting of individual stocks; the strongest-performing company, sector or country in terms of sustainability can have weight that is banded through optimisation constraints. Through these measures, the index design aims to achieve a sustainability enhancement of the portfolio investment while maintaining a near-identical exposure profile to the benchmark.

Figure 18 – Index vs. Benchmark Characteristics

Index Characteristics		
Attributes	FTSE EPRA Nareit Developed Green Low Carbon Target	FTSE EPRA Nareit Developed
Number of constituents	351	359
Net MCap (USDm)	1,609,284	1,725,384
Dividend Yield %	4.12	4.00
Constituent Sizes (Net MCap USDm)		
Average	4,585	4,806
Largest	121,469	116,300
Smallest	72	119
Medium	1,581	1,593
Weight of Largest Constituents (%)	7.55	6.74
Top 10 Holdings (% Index MCap)	32.52	32.41

Source: FTSE Russell index data taken as of June 2024

The balance between benchmark replication and targets that mandate deviation from benchmark has two main implications, tracking error and attribution effect. Figure 16 in the previous section demonstrates how tracking error can increase due to market shocks that have limited flow-through to index methodology and underlying data. Sustainability of assets has a direct relationship with operations and usage. Covid restrictions brought an abrupt halt to commercial property operations for a large proportion of the underlying assets, with retail, office and hotel assets experiencing the most dramatic drop in usage. While the viability of these assets was being questioned, sustainability performance metrics were off the charts, with near zero emissions and energy usage. This period coincides with the unusually high tracking error for the index, which then normalised as restrictions eased across the market.

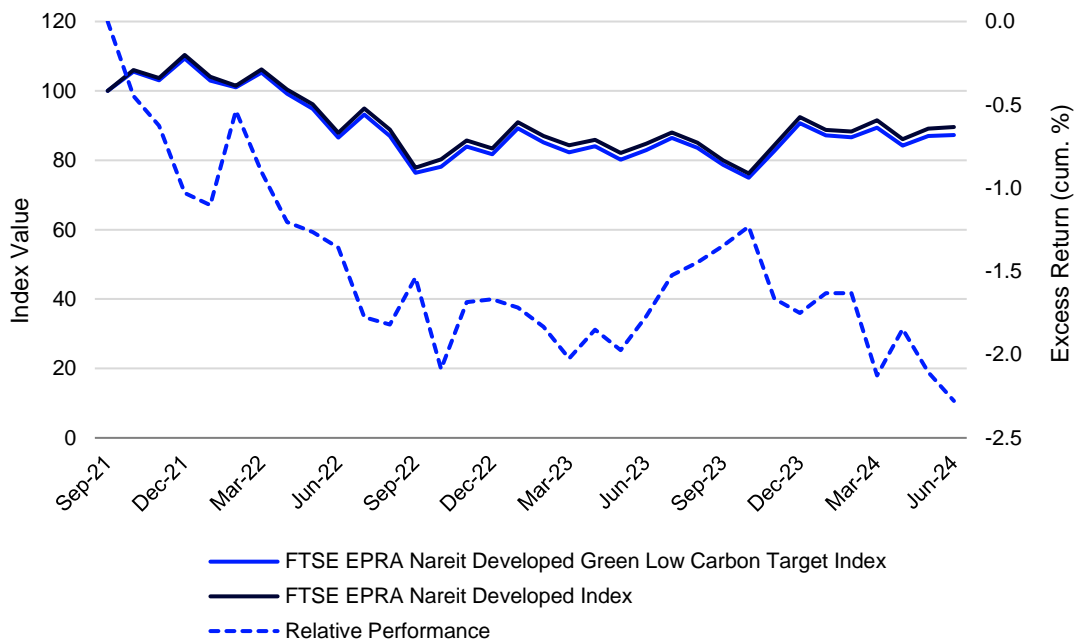
Figure 19 – Tracking error (June 2024)

Index	Tracking error (%pa)	
	1Y	Since 30/09/2021
FTSE EPRA Nareit Developed Green Low Carbon Target Index	1.003	0.987

Based on weekly data Based on monthly data

Source: FTSE Russell index data taken as of June 2024

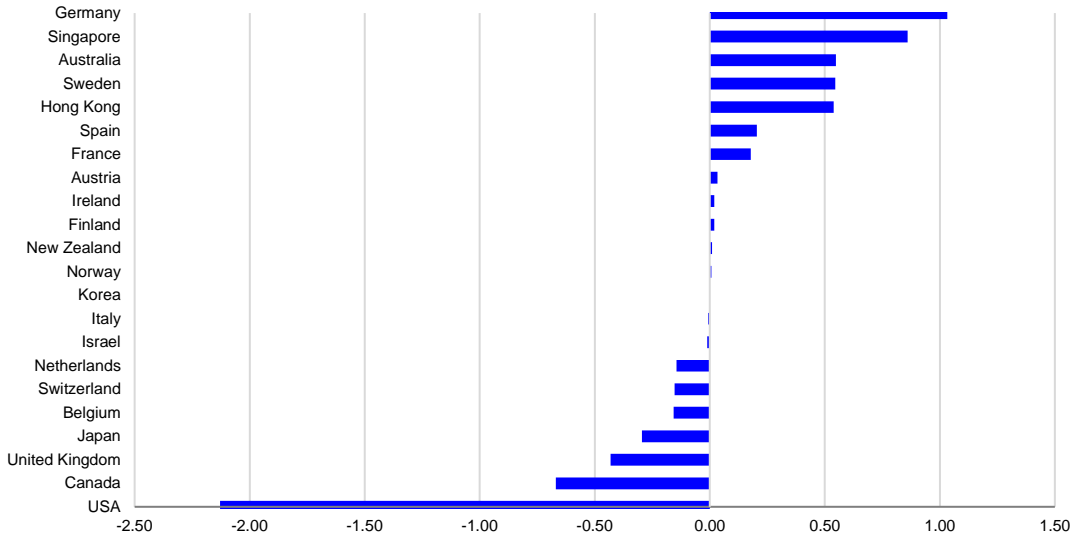
Figure 20 – Excess return Q3-2021-Q2-2024



Source: FTSE Russell index data taken as of June 2024

The index has tracked lower than the benchmarks since restrictions were officially eased in all global jurisdictions (Q3-2021), while meeting the required sustainability targets on certifications and reduction on energy intensity and carbon emissions. Relative returns are shown in figure 20. This deviation is driven by active weights at the sector and country level. In terms of country allocation, the index weight for USA is 2.13% lower than in the benchmark, which dragged the performance in this period. Positive active weight markets such as Germany (1.03%) and Hong Kong (0.54%) at the same time also had dampening effect on performance.

Figure 21 – Active Weights by Country (June 2024)

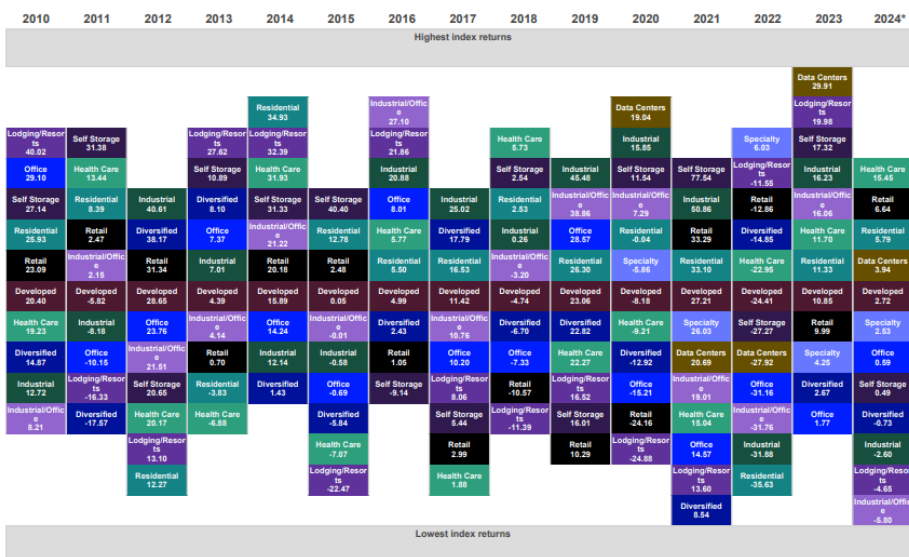


Source: FTSE Russell index data taken as of June 2024

Over the longer time horizons, sector weights have proven to be key drivers of overall return, compared to other factors. Given current index methodology and dependency on data covering certification, energy intensity and emissions, sector-specific data coverage has influence on active weights. As figure 17 depicts, Core property sectors such as Office and Residential have a higher weight compared to some niche sectors.

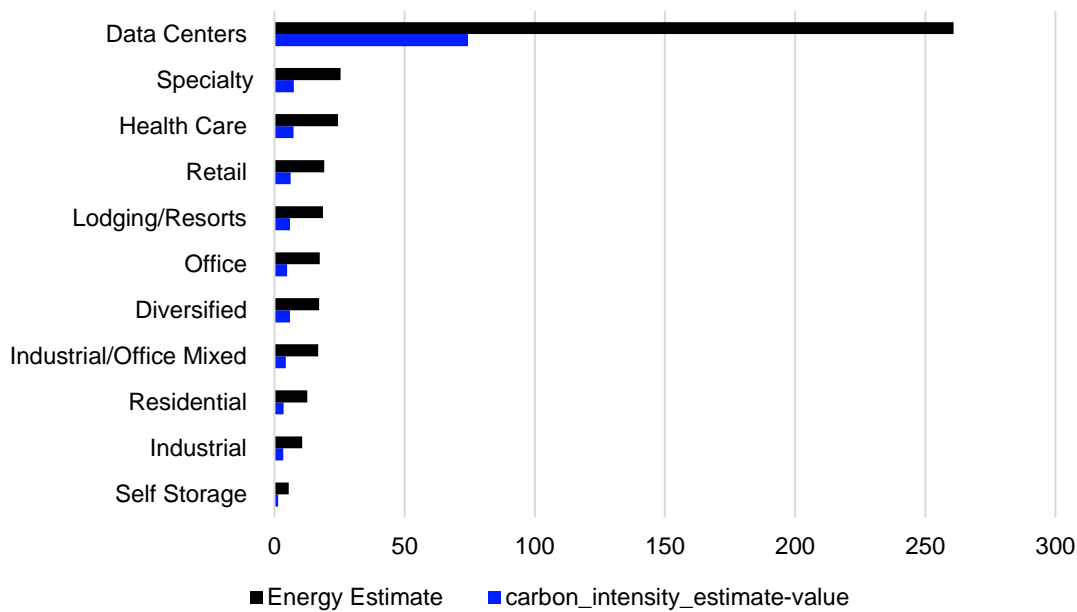
Certifications for core sectors are more established with consistent disclosure, a positive in terms of weight determination for the index. The Office sector, in particular, has faced headwinds in recent years. Equally, healthcare and data centres, which are on the lower end of certification coverage, have been above benchmark in recent months. Furthermore, Data Centre weight is directly impacted by the sustainability performance of the assets in terms of energy usage and carbon intensity.

Figure 22 – Annual performance by property sectors USD



Source: FTSE Russell index data taken as of June 2024

Figure 23 – Carbon Emission and Energy Intensity by Sector (June 2024)



Source: FTSE Russell index data and Measurabl WBE data, taken as of June 2024

While active weights are on a country and sector level, within these, individual stock selection can be equally as significant. For instance, a strong performing sector may be underweighted in the index, while the actual stock selection within it can drive performance from idiosyncratic, stock level factors. These are more common for shorter time horizons.

Beyond the recent short-term deviation, there is evidence to suggest that the Index may track differently over the longer term. A few examples of initiatives at a stock level with potential to impact active weights and overall index performance include renewable energy sourcing, energy efficiency and regulation.

There is currently a growing trend of sourcing renewable energy among REITs. Current examples include AEON Co., a retail REIT in Japan, and Prologis, a global industrial REIT, both of which are investing significantly in renewable energy. AEON Co has committed to sourcing 100% renewable electricity to power its global business operations by 2030, while Prologis has integrated solar panels across the largest network of logistics facilities, globally.

Energy efficiency is another factor with the potential to impact long-term performance. As energy costs rise and climate policies become more stringent, energy-efficient buildings are likely to generate stronger yield, compared to environmentally obsolete assets. Alexandria Real Estate Equities, a REIT specialising in life sciences and technology campuses, has spearheaded energy efficiency in addition to prioritising renewable sourcing. Furthermore, sustainable assets are also increasingly contributing to the top line with evidence of rent premiums for greener assets. Boston Properties, one of the largest office REITs has been able to command higher rents for its LEED-certified buildings.

The data centre sector represents a unique challenge in the context of sustainable real estate investing. These facilities are critical to the global digital economy, supporting essential services like cloud computing and data storage, but their high energy intensities are not aligned with index sustainability target. This is also an area of rapid development on energy transition, as the industry accelerates the adoption of renewable energy sources. Some key players leading sustainability initiatives are:

- Digital realty has been at the forefront of this transition. The company has set its target to use renewable energy for all its global operations by 2030.
- Equinix has implemented a programme to capture and repurpose waste heat generated by its data centres. In Finland, for example, Equinix’s data centres export excess heat to a local district heating network. The REIT has also committed to achieving 100% renewable energy coverage for its global data centre portfolio

As publicly listed entities, companies within the index need to take a more proactive approach to regulatory risk due to their visibility over privately owned assets. This is particularly relevant in the European Union, where regulatory frameworks like the EU Taxonomy for sustainable activities are becoming increasingly stringent. REITs such as Unibail-Rodamco-Westfield (URW), are positioning themselves ahead of these regulations by integrating sustainability into their core business strategies. URW has committed to reducing its carbon footprint by 50% by 2030 and achieving net-zero emissions by 2050.

The index review process systematically evaluates such market developments as data becomes consistent and available.

Conclusion

This paper discussed how emissions data is evolving in the listed real estate landscape. First outlining the importance of the sector to global climate outcomes, and conversely the importance of climate performance to broader company performance. This climate exposure was then broken down further into the core emissions exposures of operational and embodied emissions.

An assessment was then given of the current landscape of public disclosures relating to these emissions topics and the associated challenges in scope alignment and granularity, as well as the current regulations and initiatives helping to increase quality and consistency in this field.

FTSE Russell's approach to data collection and index construction, alongside data partner Measurabl was assessed. Comparing the data from Measurabl's Whole Building Estimates model to directly collected and publicly disclosed data sources. These assessments found deviations in-line with data treatments applied to ensure consistency in the WBE dataset.

Recent underperformance from the FTSE EPRA Nareit Low Carbon Target Index was also attributed to active share in specific sectors and countries throughout the COVID and post COVID period, but with optimism towards the potential future index performance alongside future index trends.

In assessing the current index approach, target exposure approach is highly suitable to capture quantifiable sustainability focused objectives for a rapidly evolving asset class, allowing dynamic adjustment of weights at the stock level, while ensuring diversification remains aligned with the overall opportunity set of the market.

On the data front, metrics selection is based on consistency and coverage, and the scope of metric is continuously reviewed. This iterative process ensures that the index remains in sync with the latest sustainability trends, regulatory changes, and technological advancements in the real estate sector.

On the market level, long term drivers include premium rents for, reduced regulatory risks, and lower energy consumption. Deviations in the short term, therefore, should be interpreted in the context of data-driven approach, rather than as an indicator of the index's long-term potential on delivering returns while enabling environmental impact.

Appendix A – Measurabl Data Modelling and Confidence Analysis

Measurabl has supported real estate owners with ESG data collection and reporting, its legacy core business, for over ten years. In this time Measurabl has amassed a significant amount of property-level, sustainability data – its database holds approximately 110,000 assets across 93 countries and fresh, meter-level, utility data flows in on a monthly basis.

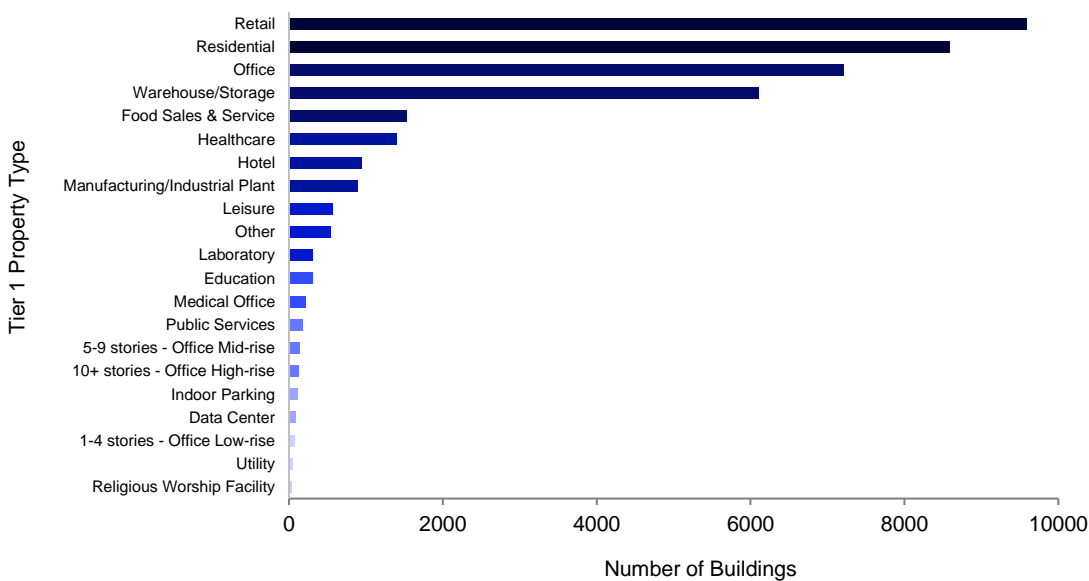
This measured data powers Measurabl’s machine-learning model that in turn can generate whole building energy and carbon estimates for virtually any building in the world and include operational scopes 1, 2 and 3. Measurabl complements its asset-level modelling capabilities with data collection via public disclosures to provide aggregated, company metrics for 100% of the FTSE EPRA Nareit Developed Index constituents.

Data preprocessing

Measurabl applies a stringent data cleaning process in order to surface the highest quality, measured energy consumption data on which to train its machine-learning model. The data cleaning process includes the use of space-level data, which is aggregated at the building level to ensure energy use intensity (EUI) is not underestimated due to spaces with missing data. Buildings with anomalies and outliers in floor area and EUI are excluded, as are buildings with incomplete meter data. A three-tier property type hierarchy is applied and a minimum of 20 unique buildings are required at the most granular tier in order for a property type to be included in the training set. Lastly, the training set excludes data older than five years.

Of the 110,000 assets in Measurabl’s database, approximately 40,000 make it through the cleaning process for inclusion in the whole building energy model training set. The property type distribution of this training set is highlighted below and reflects the highest quality measured or actual energy consumption data within the Measurabl database.

Figure 24: Tier 1 Property Type Distribution across model training set



Source: Measurabl data, June 2024

Model Features and Importance

Measurabl's whole building energy model requires that certain features be known inputs, including latitude/longitude, floor area, property type, year built, country, month and year of estimate, heating and cooling degree days. It infers patterns from these features or variables so that it can make performant estimates for buildings with attribute combinations that it has not seen before.

Feature importance varies in terms of impact on estimate accuracy. Building size or floor area is the most impactful, followed by property type (the most granular tier 3 followed by the more general tiers 2 and 1), year built, country and then latitude/longitude, from which heating and cooling degree days are derived.

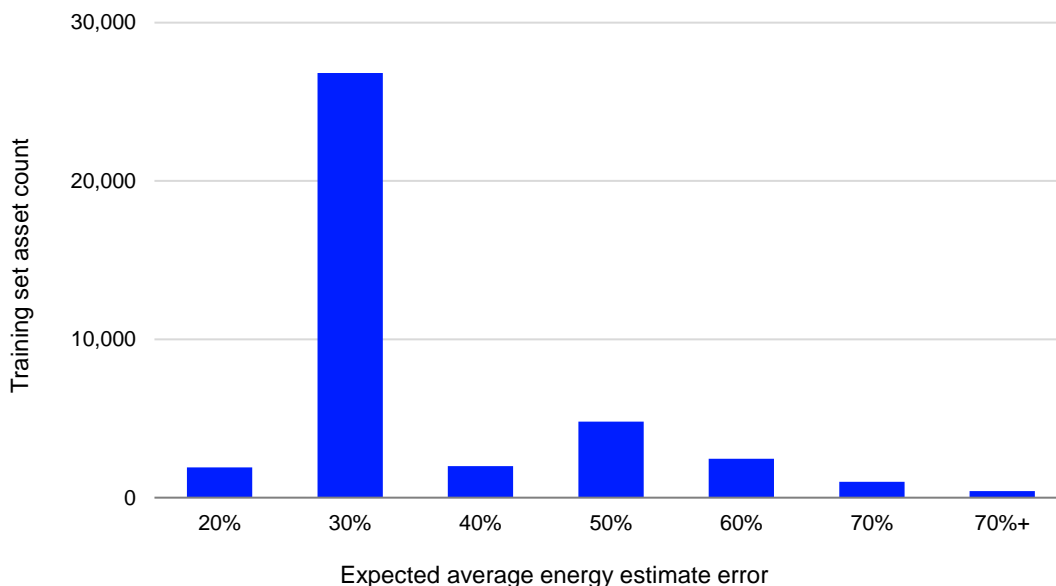
Confidence metrics

Measurabl provides the average expected energy estimate error for each property type it estimates. For example, the average error for low-rise multi-family housing (5-10 stories) is less than or equal to 23.5%. Measurabl has bucketed these average and labelled them as follows:

Confidence label	Error %
High	<=25%
Moderate	>25% – <=50%
Low	>50% – <=75%
Very low	>75%

The 40,000 assets that comprise the highest quality measured data have a property type distribution that corresponds with a weighted average energy estimates error of 30.5%.

Figure 25: Expected Energy Estimate Error Across Training Set



Source: Measurabl data, June 2024

A more granular breakout of energy estimates errors by property type reveals that six of the seven lowest errors are associated with types that had the highest asset count in the underlying training set. The exception, Warehouse/Storage, has a higher average error than its fourth-largest asset count would suggest. This is likely due to the diversity of subtypes that roll up under it, e.g., both non-refrigerated and refrigerated warehouse/storage, and their respective consumption variability.

About Measurabl

Measurabl is the world's most widely adopted ESG data platform, empowering over 1,000 customers across 93 countries representing more than 18 billion square feet of real estate to measure, manage, report, and act on ESG. Measurabl helps real estate organisations leverage ESG data to drive superior asset value and lower cost of capital, resulting in more profitable real estate.

ABOUT FTSE RUSSELL

FTSE Russell is a leading global provider of index and benchmark solutions, spanning diverse asset classes and investment objectives. As a trusted investment partner we help investors make better-informed investment decisions, manage risk, and seize opportunities.

Market participants look to us for our expertise in developing and managing global index solutions across asset classes. Asset owners, asset managers, ETF providers and investment banks choose FTSE Russell solutions to benchmark their investment performance and create investment funds, ETFs, structured products, and index-based derivatives. Our clients use our solutions for asset allocation, investment strategy analysis and risk management, and value us for our robust governance process and operational integrity.

For over 35 years we have been at the forefront of driving change for the investor, always innovating to shape the next generation of benchmarks and investment solutions that open up new opportunities for the global investment community.

CONTACT US

To learn more, visit [lseg.com/ftse-russell](https://www.lseg.com/ftse-russell); email info@ftserussell.com; or call your regional Client Service team office:

EMEA +44 (0) 20 7866 1810

Asia-Pacific

North America +1 877 503 6437

Hong Kong +852 2164 3333

Tokyo +81 3 6441 1430

Sydney +61 (0) 2 7228 5659

Disclaimer

© 2024 London Stock Exchange Group plc and its applicable group undertakings ("LSEG"). LSEG includes (1) FTSE International Limited ("FTSE"), (2) Frank Russell Company ("Russell"), (3) FTSE Global Debt Capital Markets Inc. and FTSE Global Debt Capital Markets Limited (together, "FTSE Canada"), (4) FTSE Fixed Income Europe Limited ("FTSE FI Europe"), (5) FTSE Fixed Income LLC ("FTSE FI"), (6) FTSE (Beijing) Consulting Limited ("WOFE") (7) Refinitiv Benchmark Services (UK) Limited ("RBSL"), (8) Refinitiv Limited ("RL") and (9) Beyond Ratings S.A.S. ("BR"). All rights reserved.

FTSE Russell® is a trading name of FTSE, Russell, FTSE Canada, FTSE FI, FTSE FI Europe, WOFE, RBSL, RL, and BR. "FTSE®", "Russell®", "FTSE Russell®", "FTSE4Good®", "ICB®", "Refinitiv", "Beyond Ratings®", "WMR™", "FR™" and all other trademarks and service marks used herein (whether registered or unregistered) are trademarks and/or service marks owned or licensed by the applicable member of LSEG or their respective licensors and are owned, or used under licence, by FTSE, Russell, FTSE Canada, FTSE FI, FTSE FI Europe, WOFE, RBSL, RL or BR. FTSE International Limited is authorised and regulated by the Financial Conduct Authority as a benchmark administrator. Refinitiv Benchmark Services (UK) Limited is authorised and regulated by the Financial Conduct Authority as a benchmark administrator.

All information is provided for information purposes only. All information and data contained in this publication is obtained by LSEG, from sources believed by it to be accurate and reliable. Because of the possibility of human and mechanical inaccuracy as well as other factors, however, such information and data is provided "as is" without warranty of any kind. No member of LSEG nor their respective directors, officers, employees, partners or licensors make any claim, prediction, warranty or representation whatsoever, expressly or impliedly, either as to the accuracy, timeliness, completeness, merchantability of any information or LSEG Products, or of results to be obtained from the use of LSEG products, including but not limited to indices, rates, data and analytics, or the fitness or suitability of the LSEG products for any particular purpose to which they might be put. The user of the information assumes the entire risk of any use it may make or permit to be made of the information.

No responsibility or liability can be accepted by any member of LSEG nor their respective directors, officers, employees, partners or licensors for (a) any loss or damage in whole or in part caused by, resulting from, or relating to any inaccuracy (negligent or otherwise) or other circumstance involved in procuring, collecting, compiling, interpreting, analysing, editing, transcribing, transmitting, communicating or delivering any such information or data or from use of this document or links to this document or (b) any direct, indirect, special, consequential or incidental damages whatsoever, even if any member of LSEG is advised in advance of the possibility of such damages, resulting from the use of, or inability to use, such information.

No member of LSEG nor their respective directors, officers, employees, partners or licensors provide investment advice and nothing in this document should be taken as constituting financial or investment advice. No member of LSEG nor their respective directors, officers, employees, partners or licensors make any representation regarding the advisability of investing in any asset or whether such investment creates any legal or compliance risks for the investor. A decision to invest in any such asset should not be made in reliance on any information herein. Indices and rates cannot be invested in directly. Inclusion of an asset in an index or rate is not a recommendation to buy, sell or hold that asset nor confirmation that any particular investor may lawfully buy, sell or hold the asset or an index or rate containing the asset. The general information contained in this publication should not be acted upon without obtaining specific legal, tax, and investment advice from a licensed professional.

Past performance is no guarantee of future results. Charts and graphs are provided for illustrative purposes only. Index and/or rate returns shown may not represent the results of the actual trading of investable assets. Certain returns shown may reflect back-tested performance. All performance presented prior to the index or rate inception date is back-tested performance. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index or rate was officially launched. However, back-tested data may reflect the application of the index or rate methodology with the benefit of hindsight, and the historic calculations of an index or rate may change from month to month based on revisions to the underlying economic data used in the calculation of the index or rate.

This document may contain forward-looking assessments. These are based upon a number of assumptions concerning future conditions that ultimately may prove to be inaccurate. Such forward-looking assessments are subject to risks and uncertainties and may be affected by various factors that may cause actual results to differ materially. No member of LSEG nor their licensors assume any duty to and do not undertake to update forward-looking assessments.

No part of this information may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the applicable member of LSEG. Use and distribution of LSEG data requires a licence from LSEG and/or its licensors.



**FTSE
RUSSELL**
An LSEG Business