redwheel

March 2026

Greenwheel Insights

Counting Carbon (Part 2): Dynamic baselines & targets for portfolio emissions

This is Part 2 of 2 of the 'Counting Carbon' Insights note. Part 1 outlines the challenges with tracking portfolio-level emissions. Part 2 sets out options for investors to address these challenges.

Paul Drummond

Climate and Environment Lead, Greenwheel

Executive Summary

- **Investors may seek to reduce portfolio emissions in different ways, for different reasons.** Some may prioritise reducing transition risk, while other may prioritise developing transition opportunities and impact.

- **Guidelines suggest portfolio emissions should be 'rebaselined' once the influence of external drivers** that may sit outside of an investor's emissions-related objectives, such as large changes to portfolio composition, **become significant**.

- **Investors require practical approaches** to do this, but **little guidance is available on how rebaselining should be conducted**.

- **This paper addresses this gap by outlining rebaselining methods aligned to four different 'Objective Tiers' with which investors may align**. Objective Tiers progressively narrow their range of 'legitimate' drivers of portfolio emissions, and shift in focus from reducing transition risk toward driving transition opportunity.

- Each method comes with:

- **(a) clear 'trigger' metrics** to monitor the need for rebaslining
- **(b) Flexible 'significance thresholds'** for these trigger metrics
- **(c) no need for complex analytics**, such as attribution analysis which may be difficult to conduct and communicate.
- **(d) inherent adjustments for net flows and other movements in financial metrics**, which may otherwise cloud emissions trends.

- Where required, **guidance is offered for setting and rebaselining portfolio emissions targets**, linked to each Objective Tier. However, setting portfolio-level emissions targets comes with a range of challenges.

- **Recommendations to reduce the impact of emissions data idiosyncrasies**, such as changing methods or error corrections, are also outlined.

CONTACT US

Please contact us if you would like to learn more about our strategies.

invest@redwheel.com | www.redwheel.com

redwheel

Preface: The Investor Need

"What seems straightforward quickly becomes highly complex. While AI may eventually simplify this, understanding the challenges of tracking portfolio emissions and setting targets helps investors place these efforts within their broader objectives, ranging from a broad reduction in risk through declining emissions exposure, to driving value and impact through engagement"

John Teahan

Portfolio Manager,
Redwheel Global
Intrinsic Value Team

Introduction

This paper – Part 2 of 2 – **offers recommendations to tackle the challenges associated with measuring and managing the emissions profile of a portfolio of listed equities,** as described in Part 1. This **includes methods for 'dynamic rebaselining' of portfolio emissions** based on investor objectives, **how emissions targets could be set, and when and how to adjust them** over time.

Summary of the problem *(explored in Part I[i])*

Figure 1 illustrates the **formula for tracking the emissions intensity** of a portfolio of listed equities, **and the four key drivers of change**. Figure 2 outlines the **key challenges associated with each of these drivers**.

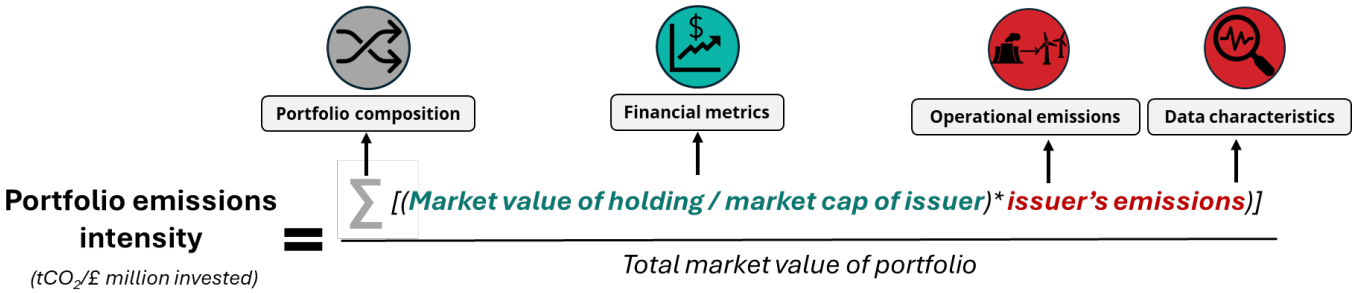


Figure 2 - Formula for emissions intensity for portfolio of listed equities. Graphic created by Greenwheel.

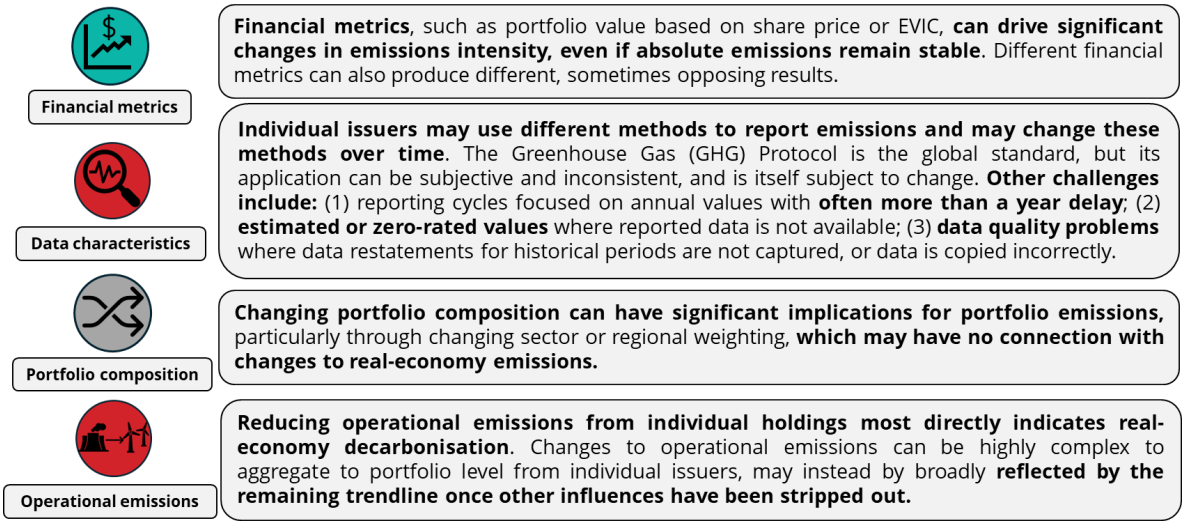


Figure 1 – Key challenges associated with each driver of portfolio emissions. Graphic created by Greenwheel.

Investors managing portfolios of listed equities require practical approaches to address these issues, including methods to adjust portfolio emissions pathways **to focus on those drivers that align most closely to their investment objectives**.

Measuring what matters

Investors tracking portfolio emissions are often seeking to reduce them. However, there may be **differences in *how* investors seek to reduce them**.

The *how* may be driven by *why*. For example, **some investors may prioritise managing their *transition risk*** exposure by moving away from emission-intensive issuers or sectors to over time. **Others may instead prioritise driving *transition opportunities*** or impact through their investments, by holding issuers that are likely to reduce their operational emissions or may be encouraged to do so through investor engagement, delivering shareholder value and real-economy emissions reductions.

These differences in priority may be broadly reflected by four 'Objective Tiers', illustrated below (Figure 3). **The Tiers are progressively more stringent** in what are considered 'legitimate' actions to influence changes to portfolio emissions.

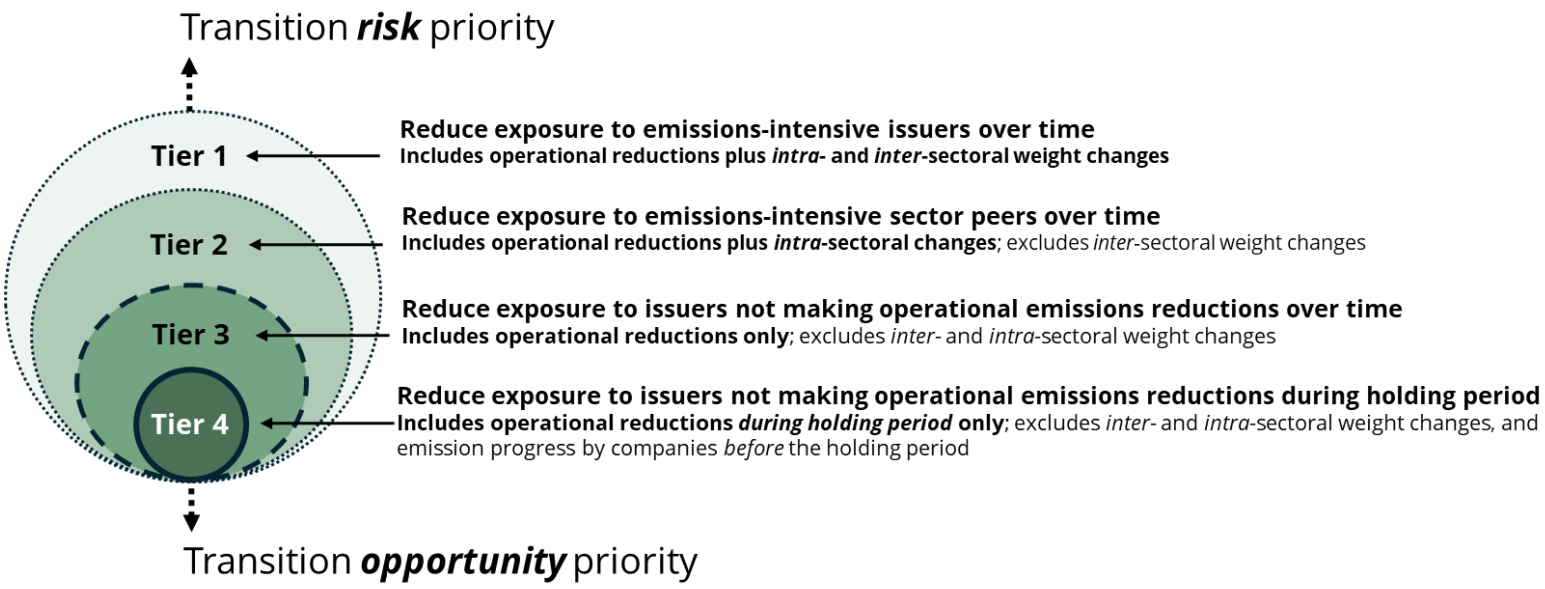


Figure 3 – Four 'Objective Tiers' for portfolio emissions reductions. Graphic created by Greenwheel. The information shown above is for illustrative purposes only.

Transition opportunities usually refer to the potential for competitive advantage, lower costs or improved resilience for early- or fast-movers transitioning to low-carbon operations or products.[ii] However, in this context **it can also refer to the opportunity for investors to deliver impact** by using engagement to drive down the operational emissions of holdings more quickly than otherwise might be achieved, with a focus on generating value that may have otherwise gone unrealised.

Engagement is a central tool under Objective Tier 4 but can be valuable across all Tiers by helping to minimise transition risks and realise opportunities. **It refers not just**

to engagement with holdings, but also policymakers and other stakeholders to help establish an enabling ecosystem and reduce dependencies that may otherwise constrain actions by individual companies or sectors. **It also helps maintain flexibility for investors** seeking to reduce their portfolio emissions by widening transition incentives and opportunities across their investment universe.

Although engagement can deliver results, it is often difficult to capture its impact.[iii] It can be even harder to understand the impact of engagement if its effect plays out over time, influencing outcomes and decisions beyond an investor's own holding period. However, the reverse can also be true, where the impact of decisions taken prior to an investor's holding period (whether due to investor engagement or not) act to reduce an issuer's emissions during an investor's holding period, for which they might claim credit.

Managing data characteristics

Regardless of Objective Tier, most investors will be keen to reduce the effect of data quirks, as described above. Figure 4 outlines key actions for issuers and data aggregators or vendors to tackle these issues. Investors may use their influence and engagement with both issuers and data vendors to encourage these actions.

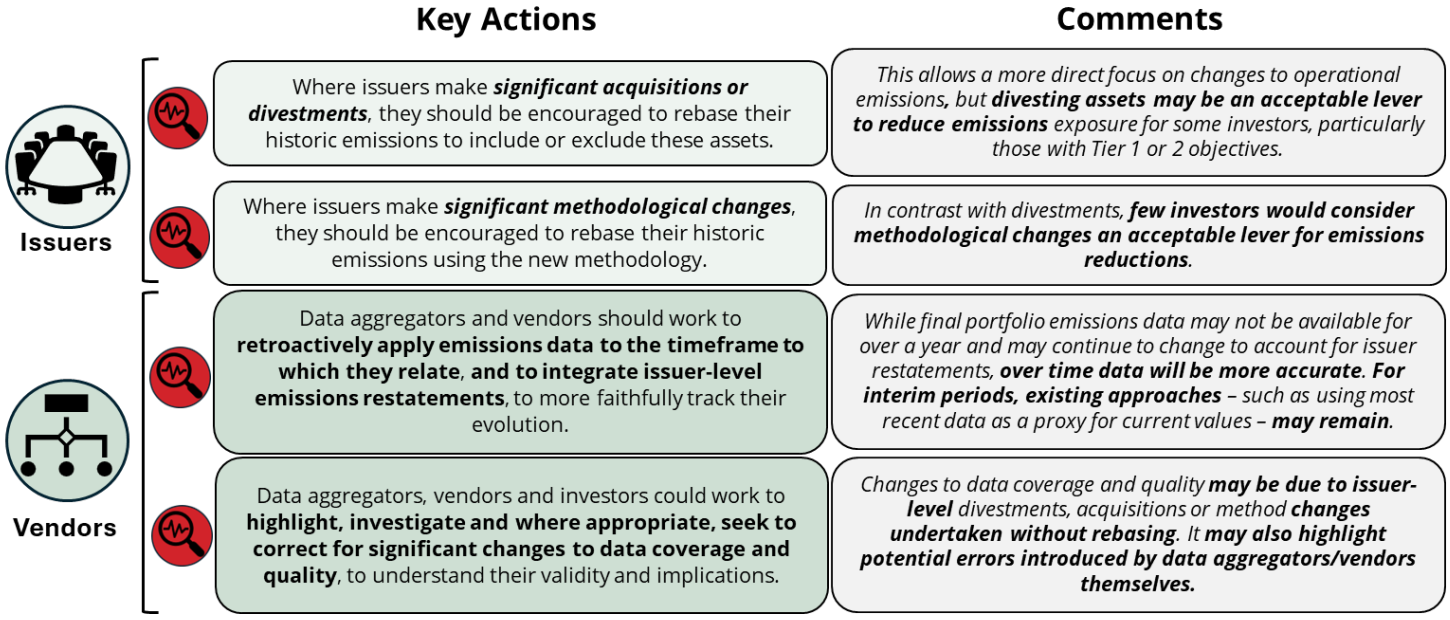


Figure 4 – Actions to reduce the influence of changing data characteristics on portfolio emissions. Graphic created by Greenwheel.

The GHG Protocol is the most widely used global standard for measuring and reporting emissions. It **requires issuers to 'rebaseline' their historic emissions** to a base year (fixed or rolling), when significant structural changes (e.g. divestments or mergers), methodological changes, or data errors occur.[iv] The Science Based Targets initiative

(SBTi), which draws on the GHG Protocol, requires rebaselining if these changes alter emissions by 5% or more of the base year's emissions.[v,1]

While this means most issuers should already rebaseline their emissions, **data vendors could flag when this guidance may not have been followed**. **Vendors could also ensure rebaselined data is included in their offering to investors**. However, challenges will remain. For example, issuers in complex sectors may continue to make different methodological choices, limiting direct comparability.

'Dynamic rebaselining' under each Objective Tier

Under some guidelines, a rebaselining of *portfolio* emissions is required or recommended once excluded factors – such as changes to financial metrics, data characteristics and portfolio composition - **exceed a predefined 'significance threshold'**.[2] However, **limited guidance is available on how rebaselining should actually be conducted**.[iv,,3]

'Attribution analysis' can track emissions drivers against significance thresholds, and various methods are available.[4] While useful, **such analysis can be complex to implement, and their results difficult to clearly communicate**.[vi]

This paper attempts to address these limitations. It describes methods for 'dynamic rebaslining' of portfolio emissions and suggests 'trigger' metrics to monitor, against which significance thresholds may be set without the need for attribution analysis.

The approach to rebaselining depends on the investor's Objective Tier. **Figures 5-8, below, suggest rebaslining methods for each Objective Tier, and trigger metrics**.

Even for investors with a focus on emissions intensity, **tracking absolute emissions of a portfolio allows an understanding of its emissions profile unclouded by financial metrics**[5]**, and provides a simpler and more transparent dataset to rebaseline**.

Absolute emissions may also connect more directly to any emissions-related targets set for a portfolio, and methodologies for setting them (discussed below). As such, **each rebaslining methodology focuses on *absolute* emissions**, but connections to emissions intensity metrics are also described.

---

[1] While the GHG protocol sets a guideline 5% threshold for data errors and methodological changes, it does not account for the impacts of investments, divestments and mergers.

[2] The GHG protocol requires rebaselining for Scope 3 (financed) emissions, while the Partnership for Carbon Accounting Financials (PCAF) requires adherents to set a base recalculation policy with significance thresholds stated. The IIGCC's Net Zero Investment Framework (NZIF) follows PCAF requirements (IIGCC, 2024; Greenhouse Gas Protocol, 2025; PCAF, 2022)

[3] PCAF offers a methodology, but focuses on emissions intensity only (PCAF, 2022)

[4] These include the Partial Equilibrium Approach, Three-Layer Approach, the Logarithmic Mean Divisa Index, the Index Decomposition Approach (IIGCC, 2024; MSCI, 2023; Bouchet, 2025).

[5] Both the PCAF and IIGCC NZIF recommended that absolute emissions are measured and reported, alongside emissions intensity (PCAF, 2022; IIGCC, 2024)

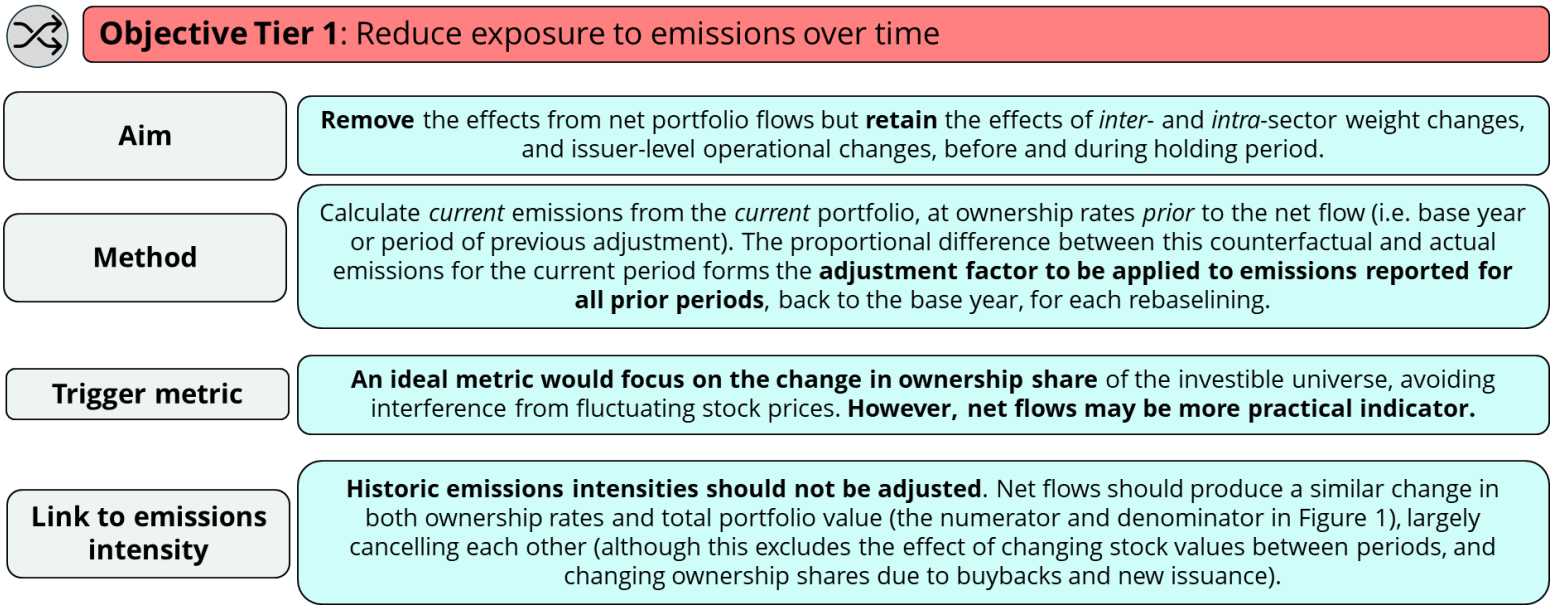


Figure 5 – Objective Tier 1 rebaslining method. Graphic created by Greenwheel.

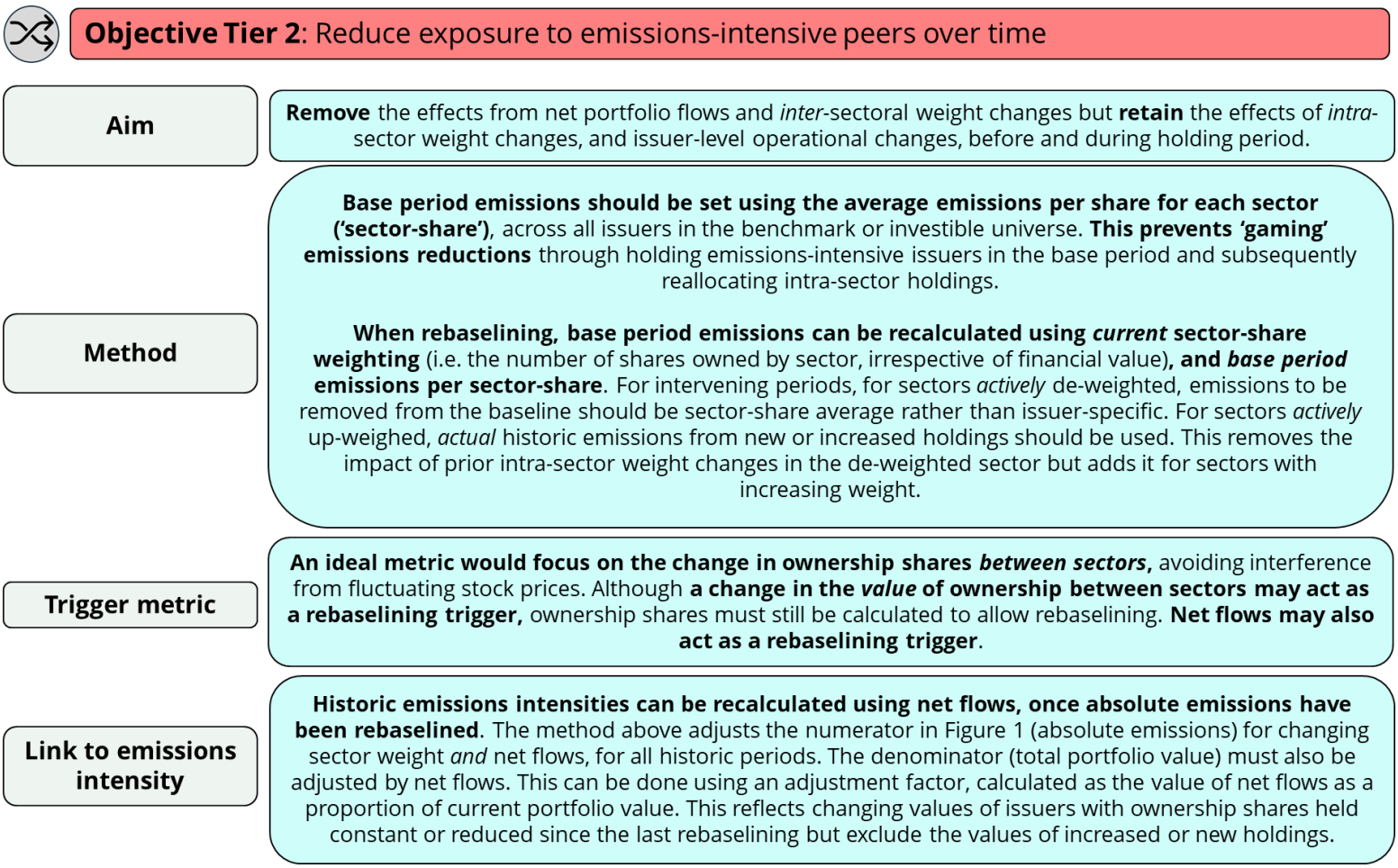


Figure 6 - Objective Tier 2 rebaslining method. Graphic created by Greenwheel.

Due to the complexity of the rebaselining method proposed for Objective Tier 2, an example is illustrated in Annex I.

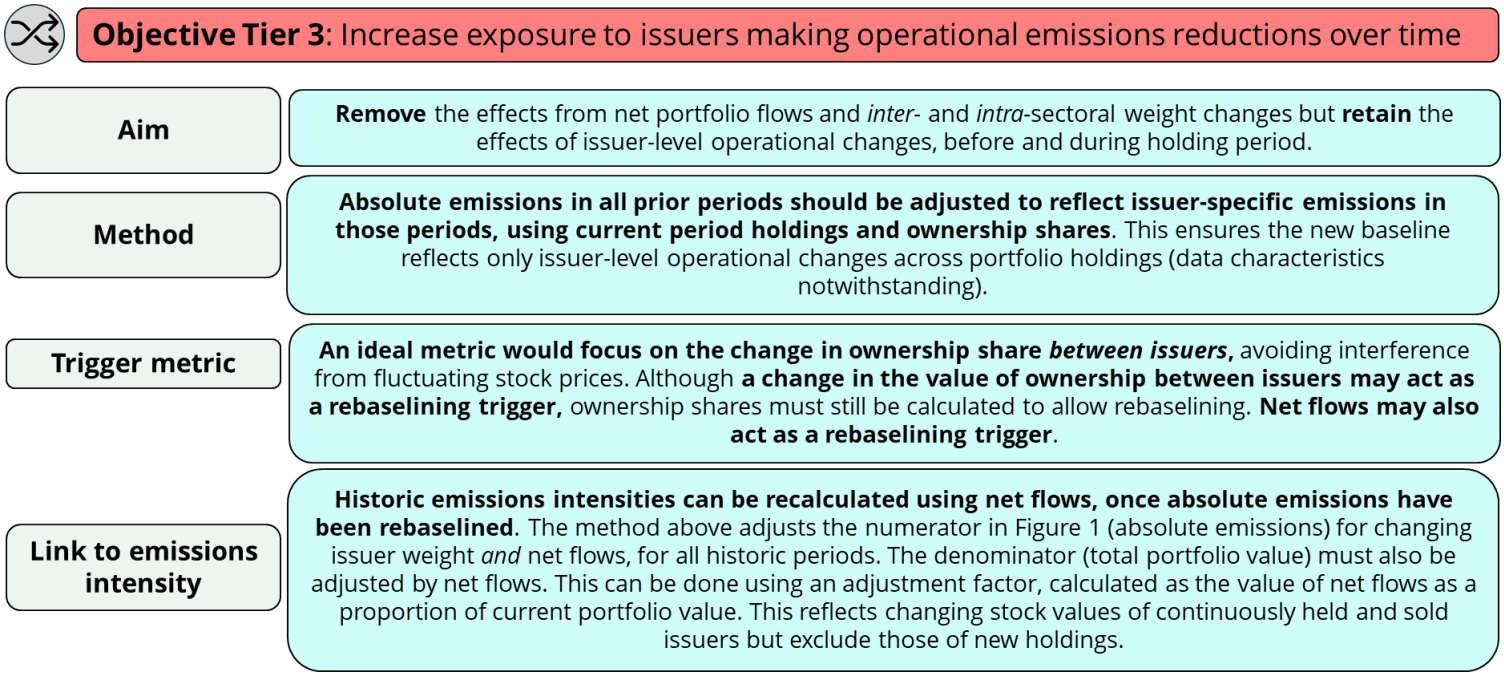


Figure 7 - Objective Tier 3 rebaslining method. Graphic created by Greenwheel.

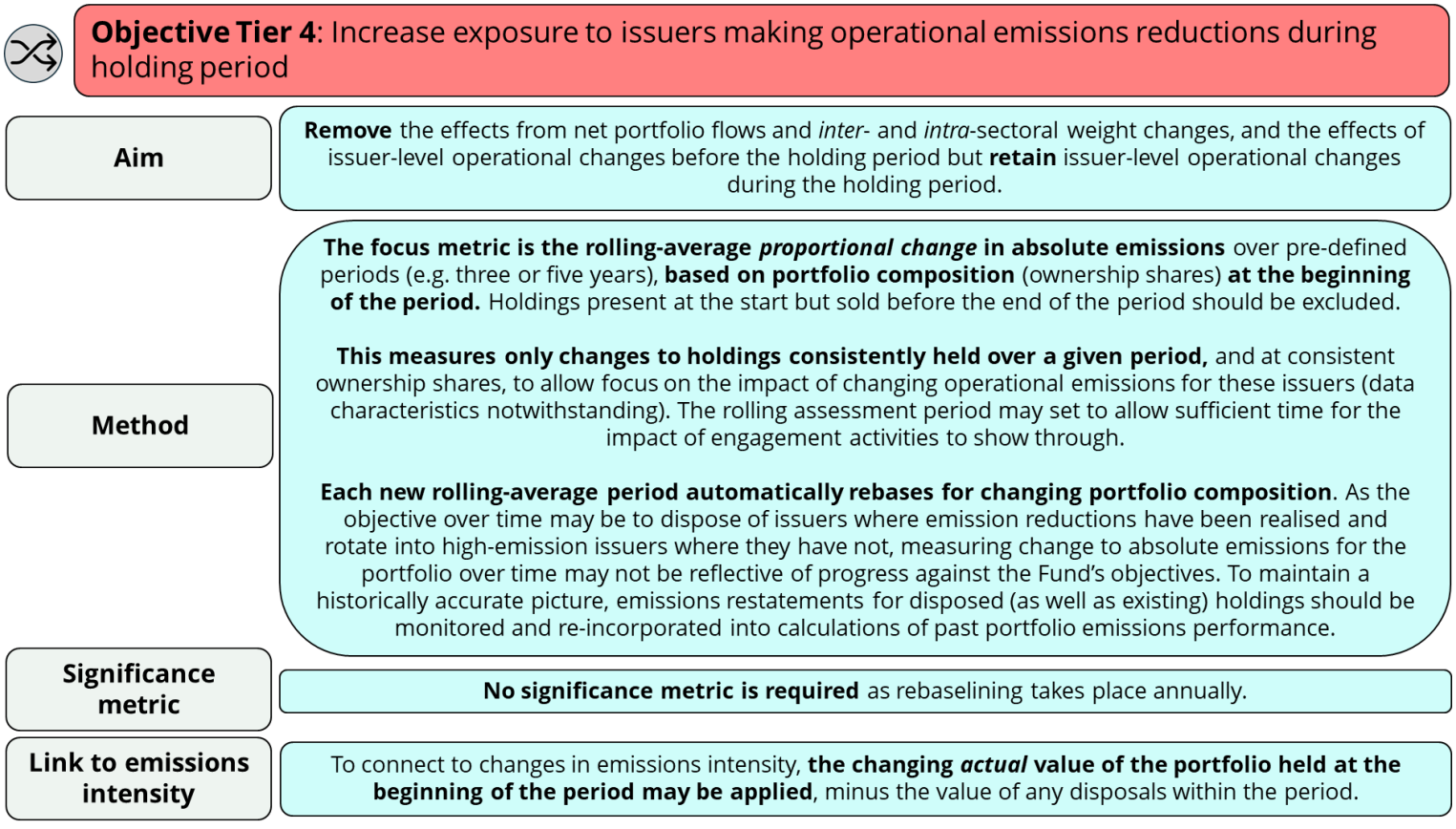


Figure 8 - Objective Tier 4 rebaslining method. Graphic created by Greenwheel.

Regardless of Objective Tier, all rebaslining methods adjust for changing ownership rates of portfolio holdings and thus changing allocation of an issuer's emissions. The most direct and significant driver of ownership changes is flows in and out of the portfolio, but reinvested dividends, along with share buybacks and new share issuance,

also have influence. If a rebaslining didn't account for this, portfolio managers would be disincentivised to attract new inflows or encourage share buybacks that may be value accretive or receive undue credit when share issuance dilutes ownership.

Individual investors can set what they consider to be suitable thresholds for their trigger metric, a breach of which triggers a rebaselining. **An alternative is to rebaseline each period** (e.g. each year or quarter), as required under Objective Tier 4, but this may place excessive burden on investors. For portfolios with infrequent trades and/or flows, this may also be unnecessary. Under each rebaselining action, adjustments to historic data made by issuers and data vendors should also be fed through.

Although not directly relevant for tracking the direction and magnitude of emissions against an Objective Tier, **investors and their clients may wish to understand how and why a portfolio's emissions pathway has changed over time**. Investors may work directly with data vendors to understand this and potentially draw on attribution analysis, discussed above.

Increasingly, AI tools may be able to conduct this analysis, alongside helping to track the evolution of trigger metrics, flag potential errors in underlying data, and investigate reasons for them.

Adjusting targeted emissions pathways

Investors monitoring their portfolio emissions may have emissions targets. These targets may focus on absolute emissions or emissions intensity, and they may be fixed value or be a proportional reduction from a base year.[6] In their application, targets may also align with different Objective Tiers.

Most targets are likely to be derived – directly or indirectly – from scenarios modelling economy-wide emissions reduction pathways required to achieve an overarching emissions and/or temperature-related goal. **This means they focus on absolute emissions pathways**, which when used for setting emissions intensity targets, requires implicit or explicit assumptions about the future evolution of financial metrics.

For investors aligning with Objective Tier 1, and with an investment universe reflecting the wider economy, **portfolio emissions targets derived from economy-wide emissions pathways are suitable**. No target adjustments are required due to changing portfolio composition.

However, **for investors aligning with Objective Tier 2, emissions targets are best set as the weighted-average of sector-level pathways**, according to their sector-share profile (i.e. the number of shares owned from each sector, irrespective of their financial

[6] They may also be set relative to the emissions profile of the portfolio's benchmark. Another approach is to set a cumulative carbon budget for a portfolio, meaning any under or overachievement of interim emissions targets increases or decreases the stringency orf the required future trajectory. Functionally, this can only be used with absolute emissions targets.

value). Most scenario modelling exercises produce sector-level emissions pathways, based on their relative ability to contribute to the overarching scenario objective under assumed conditions (with caveats – see below). **This means a rebaslining of emissions under Objective Tier 2 would also trigger a rebaselining of target pathway.**

Figure 9 illustrates how such a rebaselining might work, using a simplified portfolio with two sectors – power utilities and aluminium. Global decarbonisation pathways for these sectors are taken from the OECM 1.5°C model (discussed below). It shows the weighted decarbonisation pathway to 2050 under a portfolio with a 50/50 sector-share weighting in the base year (2019), and the revised target pathway from a reweighting in 2030 to 75/25 toward the aluminium sector.

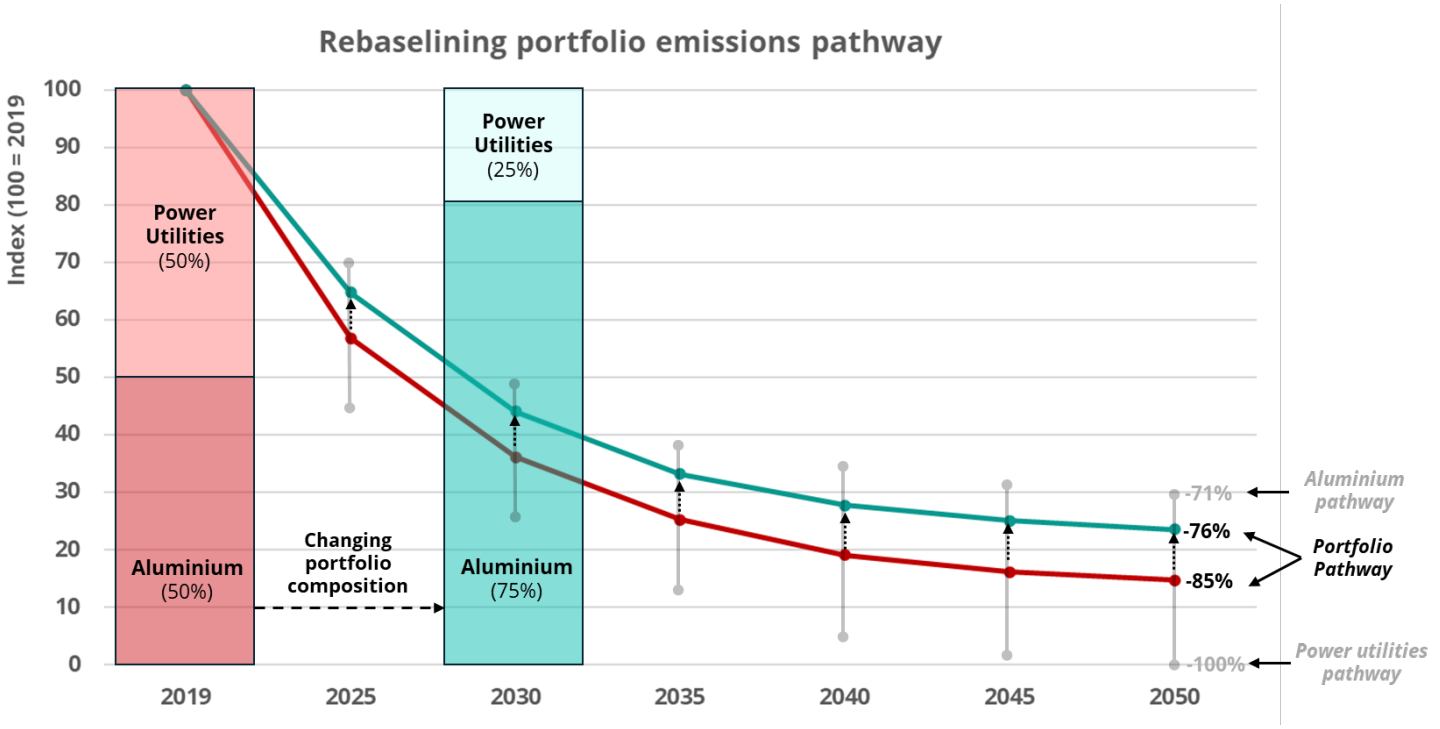


Figure 9 – Rebaslining emissions targets with changing sector-share weighting. Data source: UTS (2022). Graphic created by Greenwheel. The information shown above is for illustrative purposes. Forecasts and estimates are based upon subjective assumptions about circumstances and events that may not yet have taken place and may never do so.

A weighted-average sector pathways approach to target *setting* may also be suitable for investors aligning with Objective Tier 1, but which face an investment universe with: (a) significantly different or more concentrated than the balance of emissions in the wider economy, and/or (b) significant representation from sectors not well captured in modelling exercises (e.g. agriculture). However, target *rebaselining* would remain unnecessary.

For those with Objective Tier 3, either approach may be suitable. For highly diversified portfolios or those reflective of the wider economy, maintaining economy-wide headline targets may be suitable. **For those more concentrated, a sector-weighted approach may be appropriate**.

Emissions targets for Objective Tier 4 cannot easily be set following modelled pathways, given progress is measured as rolling-average change in emissions. Additionally, in some cases investor engagement may initially focus on improving the emissions disclosure of some issuers, which may appear to *increase* their emissions.

However, there remain several challenges to using scenario modelling exercises to set - and where appropriate, rebaseline - portfolio emissions targets for investors under Objective Tiers 1-3. Key challenges are outlined below and **mostly derive from the fact that most integrated assessment models (IAMs) are not designed for investor use,** but instead for high-level guidance for policy makers.

(1) Misaligned sector definitions. Most models define sectors by key energy production and demand activities and vectors (e.g. electricity, road transport, residential buildings), rather than industrial classifications. This can make understanding the appropriate emissions pathway difficult for a specific GICS sector, for example. Additionally, some sectors are often poorly or even entirely unrepresented, such as agriculture.

(2) Misaligned emissions scopes. Most models examine only direct (scope 1) emissions to the sectors they model, with assignment of scope 2 emissions to individual sectors potentially complex.

(3) Geographic differences. Models often only disaggregate individual large economies, grouping the remainder into regions. These economies and regions may produce different pathways for different sectors. For portfolios with issuers that operate multi-nationally, determining their appropriate emissions pathway may be complex.

(4) Scenario assumptions vs outturns. 'Normative' scenarios that work backward from a pre-defined end point (e.g. Net Zero) may include assumptions about technology, policy and preferences that may not materialise. This may place key decarbonisation options out of reach for individual issuers within a given period, particularly if key factors are outside their influence or 'zone of discretion'.[vii]

Challenge (4) is inherent to normative scenarios, and (3) is difficult to solve. However, (1) and (2) can be addressed with appropriate model structuring. For example, the One Earth Climate Model (OECM), developed by the University of Technology Sydney (UTS) in collaboration with the UN Net Zero Asset Owner Alliance (NZAOA) structures sectors by GICS and emissions by Scopes. The explicit objective behind the model's development was to be decision useful for the financial sector.[viii]

Other organisations, such as the SBTi and Transition Pathways Initiative (TPI) attempt to address challenges (1) and (2) through mapping activities, which require additional assumptions. While this can help investors and issuers with usability, the original challenge remains, and users remain dependent on mapping assumptions that may not be internally consistent, or which they may not agree with or have capacity to judge.

Annex I – example rebaselining under Objective Tier 2

This simplified, illustrative example assumes £1 million is allocated across two sectors (energy and financials) in the FTSE All-Share, in a 2022 base year. It uses a two percentage point change in intra-sector holdings as the significance threshold, which is reached in a single step in 2026. The example is based on actual but incomplete data and is illustrative only. Graphics created by Greenwheel.

1 Calculate average sector-share emissions (tCO_2/share)

	2022	2023	2024	2025
Energy	**3.84**	3.55	3.17	3.17
Financials	**0.01**	0.009	0.008	0.007

For ***setting and adjusting base year*** emissions

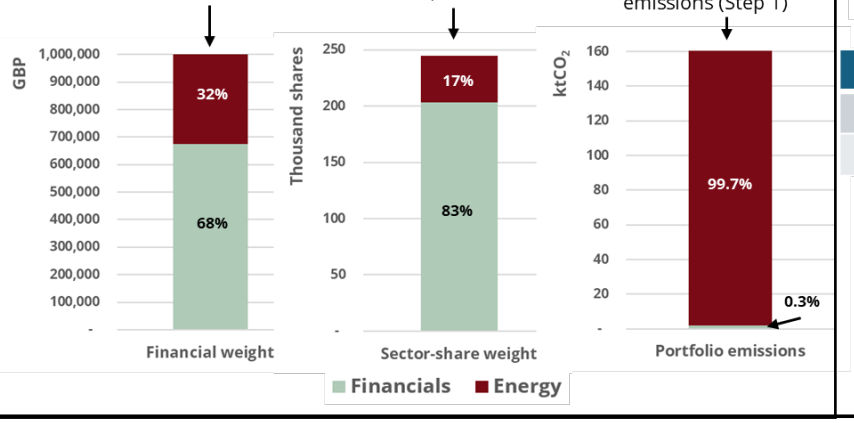
For ***adjusting interim year*** emissions

2 Calculate base year sector-share weight and emissions

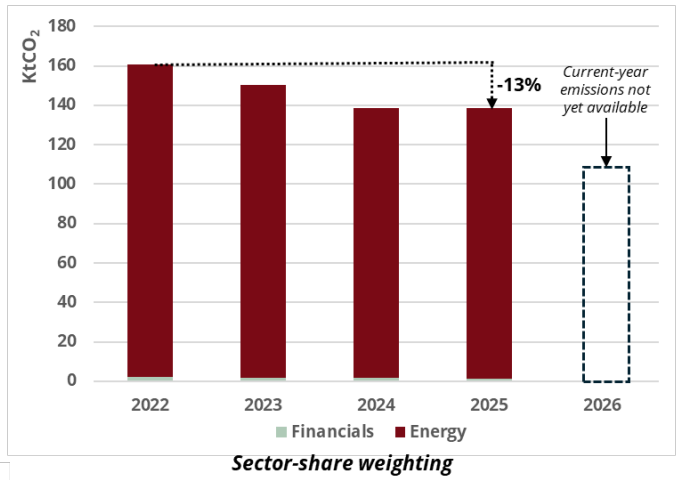
£1 million allocated to two sectors only, with ***financial* weight** set by relative sector market cap

***Sector-share* weight** calculated by number of shares bought in each sector, regardless of price.

Absolute portfolio emissions calculated by multiplying number of shares in each sector by average sector-share emissions (Step 1)



3 Aggregate portfolio emissions from holdings



***Sector-share* weighting**

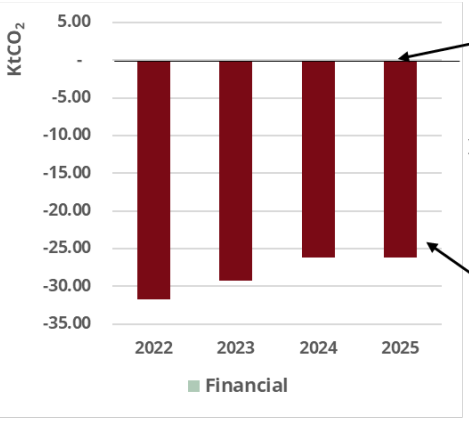
	2022	2023	2024	2025	2026
Energy	17%	17%	17%	17%	15%
Financials	83%	83%	83%	83%	85%

Base year emissions calculated as per step 2

***Sector-share* weight remains stable, so portfolio emissions are the aggregate of actual holdings**, including intra-sector weight change. ***Financial* weights may change without consequence.**

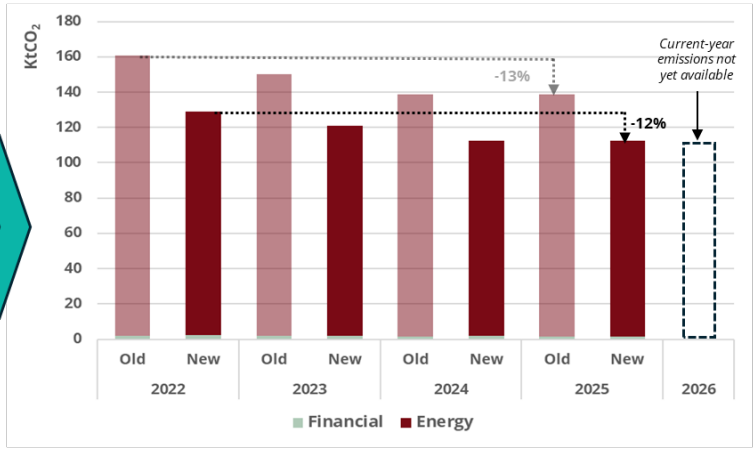
***Sector-share* weight changes above significance threshold** (2pp) in current year, **triggering rebaselining** of emissions in previous years

4 Rebaseline base and interim year emissions



Emissions *added* to the baseline for the up-weighted sector reflect ownership share of *actual* emissions for stocks bought for each previous year (*not visible here due to difference in magnitude with emissions removed)*

Emissions *removed* from the baseline for the de-weighted sector reflect the number of shares sold multiplied by average sector share emissions in each year (calculated in Step 1)



redwheel

Endnotes

[i] Greenwheel (2026)
[ii] TCFD (2017)
[iii] Minrova Research Center (2025)
[iv] Greenhouse Gas Protocol (2025)
[v] SBTi (2025)
[vi] UNEPFI (2023)
[vii] Gosling (2025)
[viii] UTS (2022)

We thank Professor Tom Gosling of the London School of Economics for his feedback during the drafting of this paper, but we stress that the contents are entirely the author's own.

Key Information

No investment strategy or risk management technique can guarantee returns or eliminate risks in any market environment. Past performance is not a guide to future results. The prices of investments and income from them may fall as well as rise and an investor's investment is subject to potential loss, in whole or in part. Forecasts and estimates are based upon subjective assumptions about circumstances and events that may not yet have taken place and may never do so. The statements and opinions expressed in this article are those of the author as of the date of publication, and do not necessarily represent the view of Redwheel. This article does not constitute investment advice and the information shown is for illustrative purposes only. Whilst updated figures are not available for all sources, we have performed further analysis and believe that this data has not significantly changed and is reflective for 2026.

Disclaimer

notice. Redwheel Group is not liable for any decisions made or actions or inactions taken by you or others based on the contents of this document and neither Redwheel Group nor any of its 22 directors, officers, employees, or representatives (including affiliates) accepts any liability whatsoever for any errors and/or omissions or for any direct, indirect, special, incidental, or consequential loss, damages, or expenses of any kind howsoever arising from the use of, or reliance on, any information contained herein. Information contained in this document should not be viewed as indicative of future results. Past performance of any Transaction is not indicative of future results. The value of investments can go down as well as up. Certain assumptions and forward looking statements may have been made either for modelling purposes, to simplify the presentation and/or calculation of any projections or estimates contained herein and Redwheel Group does not represent that that any such assumptions or statements will reflect actual future events or that all assumptions have been considered or stated. There can be no assurance that estimated returns or projections will be realised or that actual returns or performance results will not materially differ from those estimated herein. Some of the information contained in this document may be aggregated data of Transactions executed by Redwheel that has been compiled so as not to identify the underlying Transactions of any particular customer. No representations or warranties of any kind are intended or should be inferred with respect to the economic return from, or the tax consequences of, an investment in a Redwheel-managed fund. 22 This document expresses no views as to the suitability or appropriateness of the fund or any other investments described herein to the individual circumstances of any recipient. The information transmitted is intended only for the person or entity to which it has been given and may contain confidential and/or privileged material. In accepting receipt of the information transmitted you agree that you and/or your affiliates, partners, directors, officers and employees, as applicable, will keep all information strictly confidential. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information is prohibited. Any distribution or reproduction of this document is not authorised and is prohibited without the express written consent of Redwheel Group. The risks of investment are detailed in the Prospectus and should be considered in conjunction with your investment adviser. Please refer to the Prospectus, Key Investor Information Document (UCITS KIID), Key Information Document (PRIIPS KID), Summary of Investor Rights and other legal documents as well as annual and semi-annual reports before making investment decisions; these documents are available free of charge from RWC or on RWC's website: https://www.redwheel.com/ and available in local languages where required. RWC as the global distributor has the right to terminate the arrangements made for marketing Redwheel Funds in certain jurisdictions and to certain investors. Redwheel Europe is the sub-distributor of shares in Redwheel Funds in the European Economic Area ("EEA") and is regulated by the Danish Financial Supervisory Authority. This document is not a solicitation or an offer to buy or sell any fund or other investment and is issued in the UK by RWC and in the EEA by RW Europe. This document does not constitute investment, legal or tax advice and expresses no views as to the suitability or appropriateness of any investment and is provided for information purposes only. The views expressed in the commentary are those of the investment team. Funds managed by Redwheel are not, and will not be, registered under the Securities Act of 1933 (the "Securities Act") and are not available for purchase by US persons (as defined in Regulation S under the Securities Act) except to persons who are "qualified purchasers" (as defined in the Investment Company Act of 1940) and "accredited investors" (as defined in Rule 501(a) under the Securities Act). This document does not constitute an offer to sell, purchase, subscribe for or otherwise invest in units or shares of any fund managed by Redwheel. Any offering is made only pursuant to the relevant offering document and the relevant subscription application. Prospective investors should review the offering memorandum in its entirety, including the risk factors in the offering memorandum, before making a decision to invest.

This document does not constitute an offer to sell, purchase, subscribe for or otherwise invest in units or shares of any fund managed by Redwheel. Any offering is made only pursuant to the relevant offering document and the relevant subscription application. Prospective investors should review the offering memorandum in its entirety, including the risk factors in the offering memorandum, before making a decision to invest.

CONTACT US

Please contact us if you have any questions or would like to discuss any of our strategies.

invest@redwheel.com | www.redwheel.com

Redwheel London
Verde
10 Bressenden Place
London SW1E 5DH
+4420 7227 6000

Redwheel Europe
Fondsmæglerselskab A/S,
Havnegade 39, 1058
København K, Denmark

Redwheel Miami
2640 South Bayshore Drive
Suite 201
Miami
Florida 33133
+1 305 6029501

Redwheel Singapore
80 Raffles Place
#22-23
UOB Plaza 2
Singapore 048624
+65 68129540

redwheel