



UN-convened Net-Zero
Asset Owner Alliance

Target- Setting Protocol

Fifth edition

Background
document

March 2026

The Net-Zero Asset Owner Alliance (NZAOA) receives ongoing legal advice with regard to antitrust compliance—as such, this publication has undergone a legal review.

Disclaimer

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of a commercial company or product in this document does not imply endorsement by the United Nations Environment Programme or the authors. The use of information from this document for publicity or advertising is not permitted. Trademark names and symbols are used in an editorial fashion with no intention on infringement of trademark or copyright laws.

The views expressed in this publication are those of the authors and do not necessarily reflect the views of the United Nations Environment Programme. We regret any errors or omissions that may have been unwittingly made.

Suggested citation: United Nations Environment Programme (2026): UN-convened Net-Zero Asset Owner Alliance: Target-Setting Protocol—Fifth Edition

Production: UN Environment Programme Finance Initiative

Cover image: unsplash.com/photos/a-snow-covered-mountain-with-a-blue-sky-in-the-background-h0VKebUsMeo

Acronyms and abbreviations

°C	Degrees Celsius
AR6	IPCC Sixth Assessment Report
ASCOR	Assessing Sovereign Climate-related Opportunities and Risks
AuM	Assets Under Management
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CREL	Commercial Real Estate Loans
CRREM	Carbon Risk Real Estate Monitor
DQS	Data Quality Score
EPD	Environment Product Declaration
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
KPI	Key Performance Indicator
LCA	Life Cycle Analysis
LULUCF	Land Use, Land-Use Change and Forestry
LTV	Loan-to-Value
NZAOA	Net-Zero Asset Owner Alliance
NZIF	Net Zero Investment Framework
M&A	Merger and Acquisition
PCAF	Partnership for Carbon Accounting Financials
Protocol	Target-Setting Protocol
REIT	Real Estate Investment Trust
SBTi	Science Based Targets initiative
TCFD	Task Force on Climate-related Financial Disclosures
YE	Year End



Contents

- Acronyms and abbreviations..... iii
- Introduction 1
- 1. NZAOA’s theory of change 2
- 2. The scientific basis for establishing net-zero targets..... 8
 - 2.1 Scenario pathways 8
 - 2.2 Real economy progress 9
 - 2.3 Just transition 11
- 3. Background information to engagement targets 14
 - 3.1 Future of investor engagement 14
 - 3.2 Comparison of the Protocol against CA100+ criteria 15
- 4. Background information to sector and transition targets 17
 - 4.1 Background information to transition targets 17
 - 4.2 Background to sector targets 17
 - 4.3 Financial sector classification 26
- 5. Background information to sub-portfolio targets 32
 - 5.1 Comparison of absolute and intensity metrics 32
 - 5.2 Infrastructure 34
 - 5.3 Real estate 37
 - 5.4 Sovereign debt 43
- 6. Policy 49
- References 52

List of figures and tables

Figures

- Figure I:** Modelled mitigation pathways.....8
- Figure II:** Illustration of divergence of scientific and real-economy emissions pathways 10
- Figure III:** CA100+ criteria 15
- Figure IV:** One Earth Climate Model..... 20
- Figure V:** Key milestones in the pathway to net zero..... 22
- Figure VI:** HoldCo diagram..... 36
- Figure VII:** Comparison of equity share, financial control and operational control approach (PCAF, 2023)..... 38
- Figure VIII:** Building life cycle stages (PCAF, 2023) 42
- Figure IX:** Elements of ASCOR framework structure 46

Tables

- Table I:** Asset class considerations transition targets..... 17
- Table II:** Comparison of different carbon metrics 17
- Table III:** Sector modelling efforts and initiatives applying sector pathway modelling..... 19
- Table IV:** Comparison of OECM versus IEA NZ2050 scenario 24
- Table V:** Sector classification..... 26
- Table VI:** Comparison absolute metrics and intensity metrics 33
- Table VII:** Infrastructure asset types in scope 34
- Table VIII:** Four different illustrative examples how to account for building-related emissions for different investment types 39
- Table IX:** Target option 1—Carbon intensity..... 41
- Table X:** Target option 2—absolute emissions 41
- Table XI:** Definition of Scope 1, 2 and 3 for sovereigns 44



Introduction

- B1. The Net-Zero Asset Owner Alliance (NZAOA) is pleased to introduce its Target-Setting Protocol (the Protocol). Unlike the previous publication model, which was to publish a revised version annually, these standing documents will undergo regular updates, on an annual basis or less frequently, thus ensuring that the latest information is reflected.
- B2. The revised structure includes two key components:
- **Target-Setting Protocol:** This document consolidates all pertinent information for NZAOA signatories regarding target-setting and reporting criteria (all paragraphs are numbered for reference with T, e.g. *T3.1*).
 - **Background Document:** This document serves as a supplementary resource, providing additional insights on content related to target setting, allowing for detailed explanations and discussions not directly reflected in target-setting criteria (all paragraphs are numbered for reference with B, e.g. *B2*).

1. NZAOA's theory of change

- B3. Climate change is causing growing systemic disruptions to ecosystems, societies and economies. More and more investors recognize the billowing nature of climate risk, as evidenced by the surge in the number of climate-related pledges and transition plans in the finance industry since 2019. **Asset owners, such as pension funds and insurance companies, invest with long-term time-horizons and across a wide range of asset classes, geographies and economic sectors. As such, they are particularly vulnerable to the risk of climate change—a fact that all signatories of NZAOA recognize. Through risk recognition, asset owners have also come to appreciate the unique and active role that they can play in addressing global warming.**¹
- B4. Signatories of the Paris Agreement make clear in Article 2.1 that, in order to limit global warming to 1.5°C, it is essential to “make financial flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development”. To achieve this, the right investment incentives are needed to attract a sufficient scale of capital towards a low-carbon economy and to fund the decarbonization of individual companies. **NZAOA believes that for asset owners to influence incentive shifts and contribute to a net-zero transition, three main points of action are necessary; capital allocation strategies, engagement approaches, and field building.** The rest of this chapter will discuss each of these points, plus their contribution to NZAOA's theory of change and how they interact with NZAOA's Protocol.
- B5. To achieve a Paris Agreement-aligned reduction of investment portfolio emissions while maximizing real-economy outcomes, NZAOA developed its Protocol. The Protocol allows signatories to employ the combination of approaches that best supports their unique decarbonization and engagement strategies, and fulfils their fiduciary duty. The combinations revolve around four important levers of influence; portfolio decarbonization, sector decarbonization, climate solution investments and engagement. The Protocol's science-based methodology allows signatories to set targets best suited to their individual institutions, while also allowing for progress to be measured and aggregated across NZAOA.
- B6. In addition, NZAOA recognizes that policy and regulatory action is required to ensure decarbonization occurs at sufficient pace and thus actively contributes to field building through public discourse. NZAOA has shared its stance on the definition and implementation of decarbonization targets, on transparent reporting and on transition plan disclosure.

1 NZAOA (2025): Addressing Climate Impacts: An overview of NZAOA asset owners' long-term interests and responsibilities

B7. Moreover, NZAOA believes that for asset owners' decarbonization strategies to be most successful and effective, they should be applied across the whole investment portfolio; i.e. to both listed and private assets. Thus, to ensure that high-emitting companies develop transition plans regardless of their ownership structure, NZAOA argues for increased focus on private assets and on asset managers investing in them ([NZAOA, 2022a](#)).

Capital allocation strategies

B8. NZAOA signatories commit to set individual targets on engagement and at least two of the other three target types. The other target types—portfolio decarbonization, sector (with transition targets) and climate solution investments—refer to capital allocation strategies. **Defining targets based on capital allocation pushes signatories to support the transition by laying out plans to invest in ambitious companies, states and/or climate solution projects, while slowly withdrawing capital from individual companies that are not acting effectively to decarbonize.**

B9. The **climate solutions investment target** measures these “climate-positive” investments or revenue shares of the investment portfolio. The **decarbonization targets** (portfolio decarbonization and sector decarbonization target), on the other hand, focus on reductions in greenhouse gases (GHGs); i.e. reducing the “climate negative” investment shares.

B10. The capital allocation targets that NZAOA signatories set are usually fully integrated into asset owners' general asset allocation strategies, which can include:

- Strategic asset class allocation: allocation towards asset classes where low-carbon businesses have appropriate risk-return profiles (e.g. renewable power generation in private “alternative investments”), combined with exposure reduction in asset classes that offer insufficient opportunities within the needed risk-return profiles.
- Inter-sector allocation within an asset class: given that some sectors are more carbon-intensive than others, investors can optimize long-term capital allocation (with considerations to financing the transition) by increasing holdings in low-carbon sectors while decreasing exposure to high-emitting sectors.
- Intra-sector allocation: this includes overweighting industry leaders in high-emitting sectors (such as steel or cement) that demonstrate superior climate performance (currently and through forward-looking strategies), while underweighting laggards.

B11. Investors usually combine all approaches to optimize long-term, risk-return profile in line with their overall strategy. **While these portfolio decarbonization approaches do not in and of themselves lead to emissions reduction in the real economy, the two efforts are linked.** To meet their long-term obligation of safeguarding investment portfolios, investors will ultimately reallocate capital towards investments with lower-carbon intensities in consideration of long-term portfolio risk-return optimization (and may also invest in high-emitting industries to decarbonize them). In doing so, investors make capital available for the kind of new and promising low-carbon business models that are needed for the transformation of the economy. The scale by which this occurs is largely dependent on the scale and pace of enabling policies and investible technology development.

- B12. To transform the real economy, transitioning hard-to-abate sectors will be crucial. However, investment in transitioning companies may result in increased portfolio emissions in the short term. This is why **NZAOA's sector decarbonization target** establishes sector-specific decarbonization objectives, which can support sector-specific investment portfolio steering. Via this intra-sector allocation approach, the investor can analyse companies and compare their physical carbon intensity with sector decarbonization models (for example [IEA Net Zero](#) and [OECM](#)).² This sector-specific analysis can help identify “climate leaders” that align business strategies and activities to science-based decarbonization pathways; in the context of risk-return optimization, these leaders will most likely be overweighted compared to their sector peers. Thus, by considering sectoral and country-specific factors, the intra-sector approach can support NZAOA signatories in extending the necessary transition finance to hard-to-abate sectors.
- B13. **Divesting** from high-emitting sectors and investing in low-carbon sectors lowers portfolio-owned emissions but has little effect on real-world decarbonization. Divestment may have a strong indicative effect to industry and policymakers, especially when coupled with strong public discourse and messaging. Nevertheless, investors give up their voting rights by divesting and thereby lose their influence to support low-carbon strategies at investee companies.
- B14. NZAOA does not consider divestment a separate re-allocation theme. Divestment is an adjustment of the respective investment filter that all investors individually apply; no investor is invested in all companies and may be “divested” from many companies globally. However, divestment might happen when investors divest from companies or sectors due to their specific characteristics (e.g. if a company's business model or a whole sector carries significant transition risks). Most importantly, investors will exclude companies from their investment filters in cases where underlying business models do not have a positive financial and economic future in safeguarding the desired portfolio performance. Divestment may also be part of an escalation strategy—a “last resort” when requested changes discussed during engagement have not materialized or when a particular business model or associated climate risks are no longer economically viable (e.g. companies misaligned with transition pathways). Although impressive progress has been made in recent years, aligning complex financial portfolios with scientific scenario requirements and assumptions is a highly challenging task. The limited availability of reliable data is a key issue that leads to asymmetrical information and challenges for investment decision-making. The significant increase in climate risk mitigation strategies, regulatory measures and disclosure criteria are all important and contribute to a better understanding of financial stability.
- B15. On the whole, the likelihood of allocation strategies alone contributing to emissions reductions in the real economy remains uncertain as the empirical evidence is still

2 The analysis considers both past decarbonization trajectory and forward-looking transition planning. The [Transition Pathway Initiative](#) may be one valuable open-source analysis assisting these analyses. In addition to pure KPI-driven assessments, individual investees' decarbonization strategies, governance and CapEx plans are considered in investment decision-making.

limited.³ Thus, NZAOA places significant emphasis on engagement in its theory of change, which is further discussed in the next section.

Engagement approaches

- B16. Engagement is one of the most direct mechanisms by which investors can represent their interests and concerns to companies, issuers, policymakers or regulators and, more broadly, the business community. For asset owners specifically, engagement with asset managers is also a critical activity to represent the former's long-term interests to one of their closest stakeholders. NZAOA discusses some of the strengths and weaknesses of each form of engagement (corporate, sectoral, asset manager and policy) in the paper, 'The Future of Investor Engagement' ([NZAOA 2022b](#)).
- B17. NZAOA's engagement mission is for signatories' investee companies and asset managers to understand and represent its signatories' long-term interests of achieving an orderly transition to a net-zero economy. This includes asset managers holding corporate boards accountable for ensuring that management addresses climate risks and opportunities in their day-to-day business. Each NZAOA signatory individually decides—based on their business context and organizational expertise—which forms of engagement are best suited to their respective organization.
- B18. For investors to successfully address risk and influence change, the first step is differentiating between idiosyncratic risks (for which bilateral engagement has historically been effective) and systemic risks such as climate change ([NZAOA 2023a](#)). Given the systemic nature of climate change, NZAOA's theory of change vis-à-vis engagement topics revolves around supporting the systems change that is needed. The following sections explain how each stream of engagement contributes to NZAOA's theory of change.
- B19. **Asset manager engagement:** Because asset managers execute activities on behalf of their asset owner clients ([Freshfields Bruckhaus Deringer 2021](#)), they are key partners for integrating asset owners' long-term interests in the investment process. Thus, it is critical that asset owners engage their asset managers throughout the selection, appointment and monitoring (SAM) processes. To support signatories in their asset manager engagement, NZAOA's Engagement Track develops ready-to-use materials and resources. For example, the track developed Best Practice Guidelines in line with NZAOA signatories' long-term climate interests ([NZAOA 2023a](#)). NZAOA has also published guidance on [climate related proxy voting](#), [policy engagement](#) and [corporate engagement programmes](#). Once NZAOA signatories have incorporated their climate targets and stewardship expectations into their SAM processes, the asset managers that follow NZAOA's guidelines will start to win more business. By developing and promoting the use of its resources in this way, NZAOA is supporting a shift towards those asset managers whose activities promote a net-zero transition.

3 NZAOA's discussion paper 'Understanding the Drivers of Investment Portfolio Decarbonization' (NZAOA 2023d) sets the foundation for using emissions attribution analysis to discern the main drivers of portfolio decarbonization.

- B20. Other stakeholders, such as non-governmental organizations (NGOs) and academia, have a critical role to play in reviewing asset managers' approaches and the extent to which their stewardship policies are congruent with their actions; for example, a climate-aligned, proxy-voting policy of an asset manager versus the actual performance on voting. This provides critical research insights for asset owners to then use.
- B21. **Corporate engagement:** Bilateral corporate engagement (possible for shareholders as well as bondholders) is research-, time- and effort-intensive for both the investee company and the investor. This is why it is often most suitable for idiosyncratic risks at companies with lower volumes of investor inquiries. Given its resource-intensiveness, corporate engagement highlights the importance of developing engagement strategies and voting practices with clear objectives, timelines and escalation approaches. Engagement that does not lead to desired outcomes is a signal as to where efforts need to be allocated next in order to address the systemic hurdles preventing decarbonization. NZAOA's engagement target asks signatories to focus on the top portfolio emitters that they can have the most additional impact on and that are critical to the climate transition. Engagement is not a suitable approach if the investee company follows a strategic path that cannot be aligned with the investor's long-term interests. Ultimately, corporate engagement should either lead to desired outcomes or should serve to identify the systemic hurdles preventing decarbonization and indicate where resources should be allocated next.
- B22. **Collaborative engagement:** In instances where investee companies are reaching the bounds of what they can achieve based on the current or expected policy and regulatory environment, collaborative engagement within sectors and across value chains can help address some of the main hurdles.⁴ However, for collaborative engagement to work, companies need to align their own lobbying with their stated climate commitments. The process is also important in that it provides an opportunity for investors to understand the systemic hurdles facing decarbonization and the types of incentives needed to address these hurdles.
- B23. **Policy engagement:** Engagement with companies and sectors relies on promoting voluntary actions that are then rewarded by the market via cost-cutting, margin-expanding or revenue-expanding activities. However, there are limits to voluntary actions and economic incentives are necessary to address systemic barriers to decarbonization. This is why NZAOA's Commitment is based on the expectation that governments will follow through with their own Paris Agreement commitments, and why NZAOA signatories are also encouraged to push governments to act through policy engagement activities that are aligned with signatories' net-zero commitments (NZAOA 2023b). In addition, signatories are encouraged to set an expectation for asset managers to align both their own and investee companies' lobbying activities with their respective climate commitments.

4 Collaborative engagement must be undertaken with proper respect for antitrust laws and regulations or applicable regulatory requirements.

Field building

- B24. **Field building** refers to changing the norms and standards in the ecosystem in which asset owners—together with asset managers, investee companies, regulators and policymakers—are embedded (MacLeod & Park, 2011; Marti *et al.*, 2023). Norms and standards are a precursor to the ambitious climate policies and regulation that are necessary to overcome systemic barriers to decarbonization. Thus, NZAOA sees that field building contributes in the medium term to a “new normal” for asset owners and other financial institutions, whereby larger financial flows will go towards a sustainable economy and will incrementally increase support for governmental and societal commitments to fully implement the Paris Agreement.
- B25. Asset owners can influence these fields by changing the discourse, delegitimizing certain business activities, establishing voluntary standards and supporting or calling for regulatory and policy changes that may lead to mandatory standards. The very founding of NZAOA and of various similar financial net-zero initiatives and alliances has already contributed to changing the ambition levels that are expected. Moreover, the robust target-setting methodology put forward by NZAOA, coupled with the ambitious targets and high-quality content work delivered by its signatories, has continued to drive field development. In this way, the Protocol has changed the baseline ambition level of financial institutions on climate change beyond just NZAOA signatories.
- B26. Similarly, the expectations towards asset managers increased through NZAOA’s key publications on the topic; regulators and policymakers are also more aware of net-zero investor needs thanks to calls to internalize the benefits of decarbonization through blended finance ([NZAOA 2022c](#)) and carbon pricing ([NZAOA 2022d](#)). Given that the effectiveness of field building grows as the existing approaches converge over time, NZAOA will continue to work and share expertise with other initiatives and stakeholders.

From theory to implementation

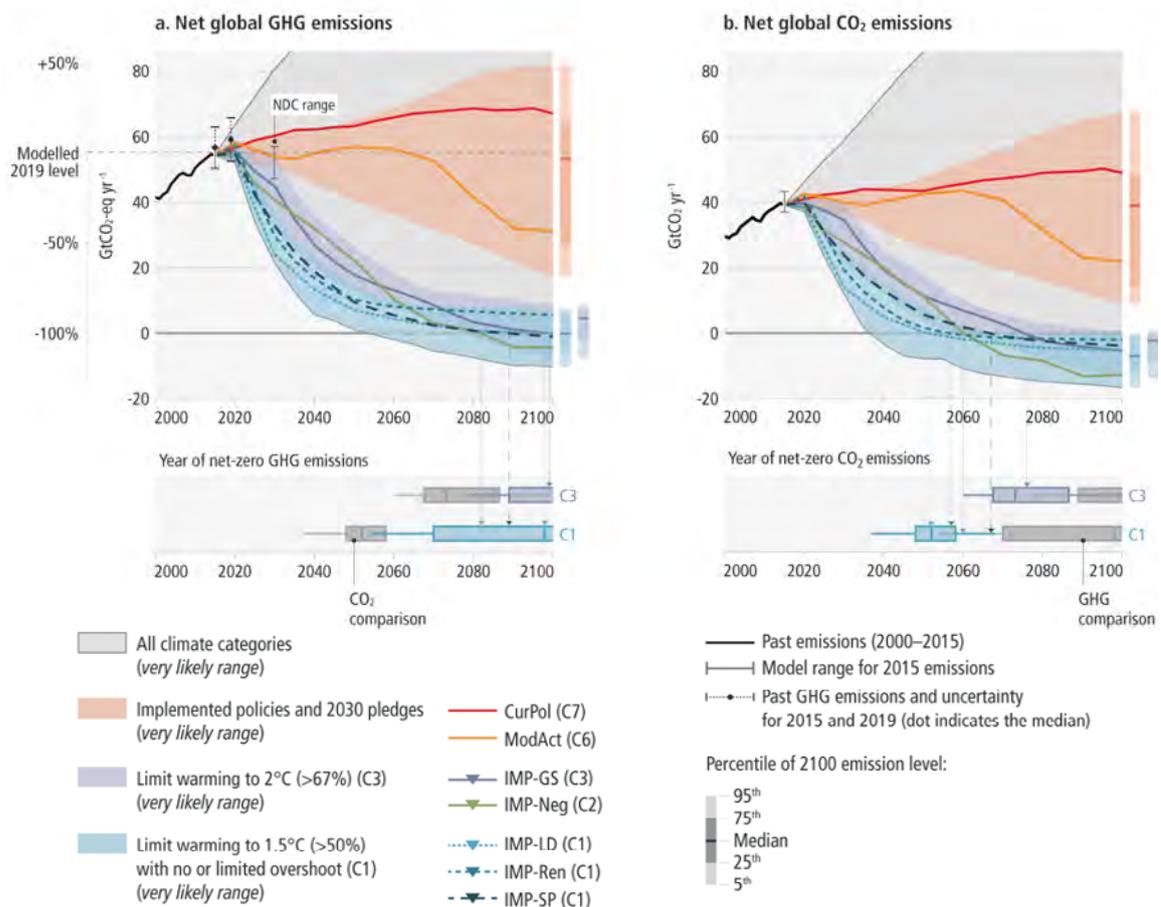
- B27. Each NZAOA signatory has its own unique characteristics that must be carefully considered. Asset and liability management (ALM) constraints, regulation, market conditions, risk-return appetite and investment objectives all differ between signatories and regions. This affects the decarbonization mechanisms and approaches that an individual asset owner can deploy. What is more, aligning complex financial portfolios with scientific scenario requirements and assumptions is a highly challenging task. The **availability and comparability of reliable data** are key issues that can pose challenges for investment decision-making.
- B28. Notwithstanding the above limitations and constraints, it is NZAOA’s belief that progress is more important than perfection and climate action cannot wait. Thus, NZAOA signatories shall set targets based on the criteria outlined in this Protocol and shall provide an explanation if they cannot do so. Based on NZAOA’s theory of change, the Protocol is central to all “three main points of action”—i.e. **capital allocation strategies, engagement approaches and field building**—in that it incorporates capital allocation strategies and engagement approaches in its methodologies, while also contributing to field building by serving as an influential publication in the financial industry. As methodologies and data availability improve, these strategies will be refined and adjusted.

2. The scientific basis for establishing net-zero targets

2.1 Scenario pathways

B29. The Scientific Basis Chapter sets out the recommended emissions reduction range for NZAOA signatories. The following explains the assumptions for deriving this range.

Modelled mitigation pathways that limit warming to 1.5°C, and 2°C, involve deep, rapid and sustained emissions reductions.



B30. **Figure I:** Modelled mitigation pathways

B31. Assumptions

- NZAOA requires use of no and low overshoot scenarios only (referred to as C1 pathways in IPCC's AR6): NZAOA is committed to reviewing climate science and

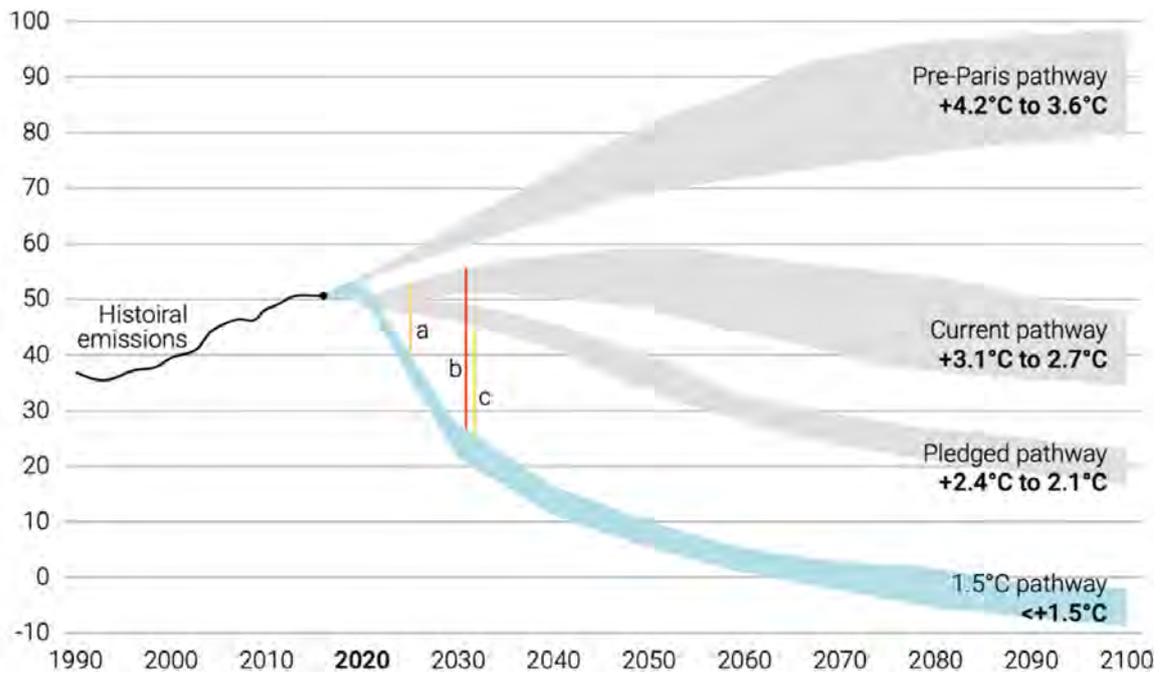
the resulting suggested ranges for emissions reductions with every revision of the Protocol, taking into account the latest climate science.

- Carbon dioxide (CO₂) trajectories provide the blueprint for all GHGs; NZAOA's goal is net zero by 2050 for all GHGs, which is more ambitious than the IPCC 1.5°C climate scenarios because these largely see net zero for non-CO₂ GHGs later than 2050. However, due to data reporting practices at present, data are typically reported in carbon dioxide equivalent (CO₂e). Thus, NZAOA will need to set targets on CO₂e. This has the effect of somewhat balancing out the net-zero end date between GHGs given practical constraints for tracking GHG emissions reductions as CO₂e.
- Global pathways are sufficient when portfolios are diversified regionally and by sector.
- When scenarios do not provide data for 2015, 2025, 2035 etc., when needed, the data are linearly projected. This method is reviewed by NZAOA's Scientific Advisory Board.
- To be less sensitive to the assumptions and narratives of individual scenarios, NZAOA will always rely on the median of a set of scenarios; namely, the C1 scenarios of IPCC's AR6. For the emission reduction range 2025, NZAOA used IPCC's SR15 scenarios (p1–3) and, in addition, filtered those scenarios that foresaw reductions of more than 2 per cent from 2015–2020, since the emissions reductions seen during these years were not as scenarios projected (aside from the impacts of the COVID-19 pandemic).
- NZAOA does not consider any high overshoot pathways to be eligible for the calculations and justifications of emissions reduction.
- For the emissions reduction range 2025, NZAOA uses the range as stated in the IPCC AR6 full report table on page 95, which takes a rounded, 75/25 percentile approach to the 97 scenarios of the C1 group. This results in an emissions reduction range of 40–60 per cent.

2.2 Real economy progress

B32.

It is important to note that the gap between NZAOA signatory's target setting and the real economy widens each time that, on the one hand, an NZAOA signatory adopts its own individual targets following scientific pathways, while, on the other hand, the global economy does not move as required by science (see the gap for 2025 depicted in the chart below by line 'a', and the 2030 gap depicted by line 'b'; line 'c' indicates a gap smaller than 'b' but persistent even in a scenario where governments follow through on their pledges).



B33. **Figure II:** Illustration of divergence of scientific and real-economy emissions pathways

B34. This widening ‘gap’ represents a decoupling of the targets of NZAOA signatories (or other net-zero-committed investors’) from the real-economy pathway. NZAOA aims to avoid a situation where this would require signatories to shift allocations from particular economic sectors to bring their portfolios into line with the established target range. As investments are needed to catalyse the transition, this outcome would be highly harmful to the speed of the planetary transition to net zero as the real economy is left behind, hence limiting the real impact on global warming.

B35. Therefore, there is a clear need for governments and policymakers, as well as corporates around the world, to facilitate this transition by moving in line with science and in sync with NZAOA signatories’ intended portfolio trajectories, respectively. Without this collective movement from policymakers and the real economy, NZAOA may eventually need to tolerate a ‘buffer’ or slight lag behind the scientific pathways.

B36. Many sectors will require additional financing to transform their business model and remain competitive in a decarbonizing global economy. Within each sector, companies acting as first movers tend to align their business models with net-zero pathways ahead of their peers, often through a phased, strategic approach. These first-mover companies, which are crucial in accelerating the transition in the real economy, require capital from the private sector. Therefore, setting transition targets for the investment portfolio signals demand for credible transition plans and will lead to capital being allocated to companies with actionable transition plans supported by measurable indicators, such as CapEx. Consequently, transition targets serve as a practical means to leverage an asset owner’s ability to bridge the gap and allocate capital to companies in high-emitting sectors with credible potential to transition to net zero.

B37. Outdated

NZAOA targets are based on global decarbonization pathways suitable for globally diversified portfolios. However, signatories' portfolios often do not reflect the composition of the global economy. In such cases, it is appropriate for signatories to adopt region-specific pathways that account for varying levels of transition progress, provided they remain aligned with the goals of the Paris Agreement. The use of regional pathways may result in different decarbonization trajectories across target categories. Signatories **may** also use Nationally Determined Contributions (NDCs) if the associated carbon budgets are consistent with the Paris Agreement. If NDCs are not aligned with this ambition, signatories **shall** explain their approach. It needs to be noted that the use of NDCs that are not in line with the Paris Agreement can lead to a regional pathway breaching the lower bound of the sub-portfolio target (i.e. <40%).

B38. This is in line with the Paris agreement, as the UNFCCC recognizes the principle of common but differentiated responsibilities (CBDR) in its Article 3, which states: "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof."

2.3 Just transition

B39. A just transition promotes environmentally sustainable economies in a way that is inclusive. It does so by creating decent work opportunities, by reducing inequality and by leaving no one behind. A just transition involves maximizing the social and economic opportunities of climate and environmental action, including the provision of an enabling environment for sustainable enterprises, while minimizing and carefully managing challenges (ILO 2015). The concept of just transition was incorporated in the Paris Agreement in 2015 as a way of signalling the importance of minimizing negative repercussions from climate policies and maximizing positive social impacts for workers and communities. Building on this base, a work programme on just transition pathways at COP28 acknowledged that: "climate change is a common concern of humankind and that Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to a clean, healthy and sustainable environment, the right to health, the rights of Indigenous Peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity" (UNFCCC 2023).

B40. The concept of just transition addresses the social risks and impacts on workers, businesses, communities and consumers, particularly of those most vulnerable. It also incorporates climate justice issues related to climate change that emerge within and between countries and regions. Promoting a just transition is essential to achieving broad-based support for ambitious climate action and to generating bene-

fits both for the environment and the society. As such, a just transition comprises an important aspect of achieving global, net zero GHG emissions.

- B41. Achieving a just transition requires action from all parties. Financial institutions play a major enabling role in this effort. Financing is crucial to expanding green and low-carbon activities, and to helping transform environmentally and socially unsustainable practices and activities (e.g. stakeholder engagements, including with local and Indigenous communities). It is also crucial for assisting society to develop resilience and adapt to the physical impacts of climate change and transition pathways. In 2020, more than 161 investors representing US\$10.2 trillion in assets under management (AuM) endorsed the Principles for Responsible Investment (PRI)-led [Statement of Investor Commitment to Support a Just Transition on Climate Change](#).
- B42. The Just Transition principles **should** be integrated throughout NZAOA's objectives. This is because the IPCC's Shared Socioeconomic Pathways (SSPs) show the best way to limit temperature increase to 1.5°C is through a just and inclusive transition.
- B43. A just and inclusive transition is required for all markets. However, the need is particularly acute in emerging markets, which are responsible for fewer historic emissions, but are typically the most vulnerable to climate change. In addition, these markets have fewer resources to transition from their dependence on fossil fuels while at the same time protecting livelihoods and supporting economic development.
- B44. Companies and countries with advanced technological resources and financial means tend to better align their emissions to science-based pathways. A more robust methodology of assessment **should** ideally increase opportunities for emerging markets to attract capital and investment flows in order to support a just transition in the real economy.
- B45. To meet the targets of the Paris Agreement, the financing gap in emerging markets needs to be closed by private and public investment. While innovative financing mechanisms like blended finance and Just Energy Transition Partnerships can help accelerate climate change mitigation in emerging markets, ensuring a timely and equitable transition requires more targeted private capital.
- B46. In light of the above, all NZAOA signatories **shall** steer their portfolios to align with science-based transition pathways to a net-zero economy, with due consideration for societal impacts. In order to support the implementation of the considerations discussed above, the following box provides links to useful resources and initiatives.
- B47. **Box 1:** Resources and initiatives on just transition

Government/Intergovernmental

- ILO: [Guidelines for a just transition towards environmentally sustainable economies and societies for all](#)
- EU: [Just Transition Mechanism: making sure no one is left behind](#)

Business—background and expectations

- [Just Transition Centre and B Team: Just Transition: A Business Guide](#)
- [World Benchmarking Alliance: Just Transition Assessment Methodology 2025](#)

Investors

- [Multistakeholder: Climate change and the just transition: A guide for investor action](#)
- [PRI: Climate change and the just transition](#)
- [LSE: UK Financing a Just Transition Alliance: Just Zero](#)
- [LSE: Making transition plans just: how to embed the just transition into financial sector net zero plans](#)
- [ILO: Just Transition Finance Tool for banking and investing activities](#)
- [Business & Human Rights Resource Centre: Investing in renewable energy to power a just transition: Investor Guide](#)
- [UNEP FI: Just Transition Finance: Pathways for Banking and Insurance](#)
- [TPT: Putting People at the Heart of Transition Plans: Key steps and metrics for issuers](#)

Initiatives

- [The Council for Inclusive Capitalism, which developed a Just Energy Transition framework](#)
- [Climate Action 100+, which has begun to integrate just transition indicators into assessments and are engaging with certain sectors](#)
- [World Benchmarking Alliance, which produced world-first just transition assessments for COP26 and which has a multistakeholder approach to improving companies' approach to just transition](#)
- [Impact Investing Institute, which is behind a Just Transition Finance Challenge that supports a just transition to net zero in the United Kingdom, as well as in other developed and emerging markets](#)
- [The Financing a Just Transition Alliance \(FJTA\), coordinated by the Grantham Research Institute on Climate Change and the Environment Institute, which convenes over 30 investors in the United Kingdom.](#)
- [The Just Transition Finance Lab: Global builds on the outputs from Grantham Research institute to develop a global policy research programme](#)

3. Background information to engagement targets

3.1 Future of investor engagement

- B48. Real-world decarbonization outcomes will not align with NZAOA ambitions for 1.5°C with no or limited overshoot if those outcomes are not supported by 1.5°C-aligned economic and policy frameworks. Engaging investees based on the assumption that individual companies or entire sectors would need to cease to exist, while their products still remain economically viable and in demand, is not a practical strategy for success. Instead, engagement with companies and asset managers on net zero must be complemented by support for policies and regulatory frameworks that are conducive to 1.5°C alignment across all geographies and all sectors. Necessary as traditional corporate engagement remains, therefore, it comprises an insufficient stewardship tool for achieving the real-world outcomes desired by NZAOA's ambition.
- B49. NZAOA has published a discussion paper titled '[The Future of Investor Engagement: call for systematic stewardship to address systemic climate risk \(2022b\)](#)' in which it details how the financial community can address the limits of corporate engagement. The paper calls on investors to complement their existing engagement efforts by proactively supporting sector and policy engagement that drive real-world decarbonization in line with their long-term interests. As the paper makes clear, policy engagement is critical to ensure that decarbonization in line with 1.5°C is feasible for all sectors. Should such an alignment not be possible, investors should focus on how demand for products of carbon-intensive sectors can be substituted in a way that mitigates social risks. Sector engagements, including those conducted through the CA100+ Global Sector Strategies, can help highlight and support policy incentives that enable real-world decarbonization. This focus can also build on the need for engagement with asset managers, as highlighted by NZAOA's Engagement track. Within corporate engagement, NZAOA strongly opposes companies lobbying in a manner that is detrimental to asset owners' long-term interests or to the interests of society and the wider economy. As detailed in the discussion paper [Aligning Climate Policy Engagement with Net-Zero Commitments \(NZAOA 2023b\)](#), NZAOA believes companies need to be made accountable for aligning their lobbying with their stated commitments.

3.2 Comparison of the Protocol against CA100+ criteria

B50. [Climate Action 100+](#) (CA100+) is an important initiative for collaborative investor engagement with investee companies. NZAOA encourages all its signatories join the CA100+ group and many NZAOA signatories that are signatories of CA100+ collaborate on sector-specific decarbonization pathways and support individual investor action. Collaborative engagement enhances investor influence, builds expertise and improves the efficiency of the engagement process by sharing the workload. CA100+ has released the Climate Action 100+ Net-Zero Company Benchmark, which is the CA100+ initiative's primary tool for assessing focus companies based on the analysis of publicly disclosed information. To ensure that NZAOA signatories ask of themselves what they ask of others, NZAOA has compared the ten indicators of the CA100+ benchmark framework to its Protocol. However, it should be stated that a financial institution is different from a real-economy company. As such, some elements of the benchmark do not make for analogous comparison.

- 1 Net zero GHG emissions by 2050 or sooner ambition
- 2 Long-term (2036–2050) GHG reduction target(s)
- 3 Medium-term (2026–2035) GHG reduction target(s)
- 4 Short-term (up to 2025) GHG reduction target(s)
- 5 Decarbonisation strategy
- 6 Capital allocation alignment
- 7 Climate policy engagement
- 8 Climate Governance
- 9 Just Transition
- 10 TCFD Disclosure

B51. **Figure III:** CA100+ criteria

B52. **Indicators 2 and 3: Long-term (2036–2050) and medium-term (2026–2035) GHG reduction target(s)**

We recognize that setting medium- and long-term targets plays an important role in achieving the target of net zero by 2050. However, more immediate, short-term targets are necessary to maintain accountability and signal to the broader business and regulatory community that we expect real-world decarbonization. By committing to set both short-term targets on a five-year cycle and a long-term target in line with IPCC no or limited overshoot scenarios, NZAOA believes signatories are

meeting a 1.5°C decarbonization trajectory. As portfolio targets directly depend on the decarbonization speed of investee companies, NZAOA signatories need a constant feedback loop from real-world decarbonization into their target setting. If not, targets might lead to forced divestments from specific sectors before all stewardship efforts and engagement are attempted. For investors, this is fundamentally different from the Scope 1 and 2 emissions of real-world companies where their level of control is substantially higher. NZAOA signatories implicitly make their mid-term targets by having: (i) set a long-term, 2050 net-zero target in line with 1.5°C; (ii) set a short-term target to support immediate portfolio steering; and (iii) agreed to align with no/low overshoot pathways.

B53. **Indicator 7: Climate policy engagement**

NZAOA signatories strive to align all climate policy engagement with the goal of accelerating the transition to a 1.5°C-aligned future. In this context, NZAOA signatories **should** review their membership and participation in associations and organizations. In order to be transparent, signatories **should** disclose their respective positions regarding climate policy and should publish their memberships of relevant associations and organizations. Furthermore, signatories **should** consider taking an advocacy position within organizations that do not align their climate policy advocacy with the Paris Agreement or the goals of NZAOA. Additionally, in instances where signatories' attempts to persuade organizations to become Paris-aligned are deemed ineffective over a sustained and time-bound engagement, they **should** consider cessation of membership. There may be certain aspects of financial institutions' activities that cannot be evaluated in the same way as companies by the CA100+ benchmark. For example, sovereign wealth funds are legally advised to avoid political positions or lobbying activities. For this reason, they would not be able to engage on policy in the same way that other asset owners can. The same may apply to some (re)insurance activities. An important focus for all NZAOA signatories beyond their own policy engagement activities is the climate advocacy activities of all investee companies. Engagement can help gauge a company's level of Paris-alignment through lobbying and asking for alignment where necessary.

B54. **Indicator 10: TCFD Disclosure**

NZAOA signatories **shall** commit to following the TCFD recommendations on governance, strategy, risk management and measurement in their own business operations, reporting and disclosures.

4. Background information to sector and transition targets

4.1 Background information to transition targets

4.1.1 Asset class considerations

B55a. NZAOA encourages signatories to include asset classes beyond listed equities and corporate debt, where applicable, based on the strategic alignment and materiality specific to signatories' portfolios. The table below summarizes other considerations specific to particular asset classes.

B55b. **Table I:** Asset class considerations transition targets

Asset class	Considerations
Real estate	<ul style="list-style-type: none">▪ Shall follow metrics (e.g. energy efficiency, embodied carbon) in the sub-portfolio chapter▪ Should consider additional metrics such as Energy Performance Certificates or equivalent if available
Infrastructure	<ul style="list-style-type: none">▪ Shall follow metrics and guidance in the sector chapter▪ Should include all investments in assets that are not hard-to-abate, but also not "green" (e.g. data centres and airports)

4.2 Background to sector targets

4.2.1 Comparison of carbon emission metrics

B56. **Table II:** Comparison of different carbon metrics

Intensity: Production-based metrics	NZAOA acknowledges that the lack of data availability or unreliable/weak data for production-based metrics is an issue for asset owners as the data required need to be sourced at a company level. One of the advantages of using production-based metrics for setting sector targets is that these are largely independent of economic variables (such as revenue) and have no market or price volatility. This makes it easy to track real emissions reductions in isolation and to compare performance between companies. Recommended metrics can be found in Section 8.3.
Intensity: Economic-based metrics	Sector metrics based on carbon intensity are easily available but are dependent upon economic variables (such as revenue). Also, they mainly cover Scope 1 and 2 in the sector decarbonization pathways.

Absolute emissions-based metrics

When using absolute emissions-based targets, asset owners should apply the absolute emissions sector pathways to the companies in their portfolio belonging to a given sector/geography. However, the use of absolute financed emissions metrics to set sector targets could under certain conditions drive unintended consequences, such as the decision to divest from companies that may otherwise be strategic to the transition.

4.2.2 Sector pathway comparison

B57.

The sector targets are being set using scenarios and sector pathways modelled to align with a 1.5°C carbon budget. The modelling approach provides a translation of technology development and technology use into transition and decarbonization pathways for economic sectors. The two 1.5°C models explored comprise:

- One Earth Climate Model (OECM)
- IEA Net Zero by 2050: A Roadmap for the Global Energy Sector

The two initial models (for which information was provided to NZAOA) have been compared in order to establish a corridor of possible quantitative targets. They will be used to corroborate the portfolio target to make sure portfolio targets and sector targets are aligned and consistent. It is challenging to identify multisector models that include information at the sector level, with enough granularity for target-setting purposes. NZAOA continues to call upon the scientific community and other providers to continue the advance of such modelling. In addition, the following chart is adapted from the Glasgow Financial Alliance for Net Zero (GFANZ 2022). The chart provides an overview of a number of initiatives that are seeking to use sector pathway modelling in their work.

B58.

Table III: Sector modelling efforts and initiatives applying sector pathway modelling⁵

	Modelling efforts			Initiatives applying sector pathway modelling (implementation of 1.5°C pathways in progress)		
	One Earth Climate Model	Network for Greening the Financial System ³	International Energy Agency NZE2050 ⁴	Mission Possible Partnership	Climate Action 100+	Transition Pathway Initiative
Agriculture	✓	✓				
Aluminium	✓	✓		*		*
Cement	✓	✓	✓	*	✓	*
Chemicals	✓	✓	✓	*	*	*
Coal	✓	✓ (covered in Energy)	✓		*	*
Commercial & residential real estate	✓	✓	✓			
Steel (& Iron)	✓	✓	✓	✓	✓	*
Oil & gas	✓	✓ (covered in Energy)	✓		✓	✓
Power generation	✓	✓ (covered in Energy)	✓		✓	
Transport	✓	✓	✓		*	*
Aviation	✓		✓	✓	✓	*
Shipping	✓		✓	✓	✓	*
Trucking	✓	✓	✓	*		
Auto	✓	✓	✓	*	*	*

4.2.3 One Earth Climate Model (OECM)

B59.

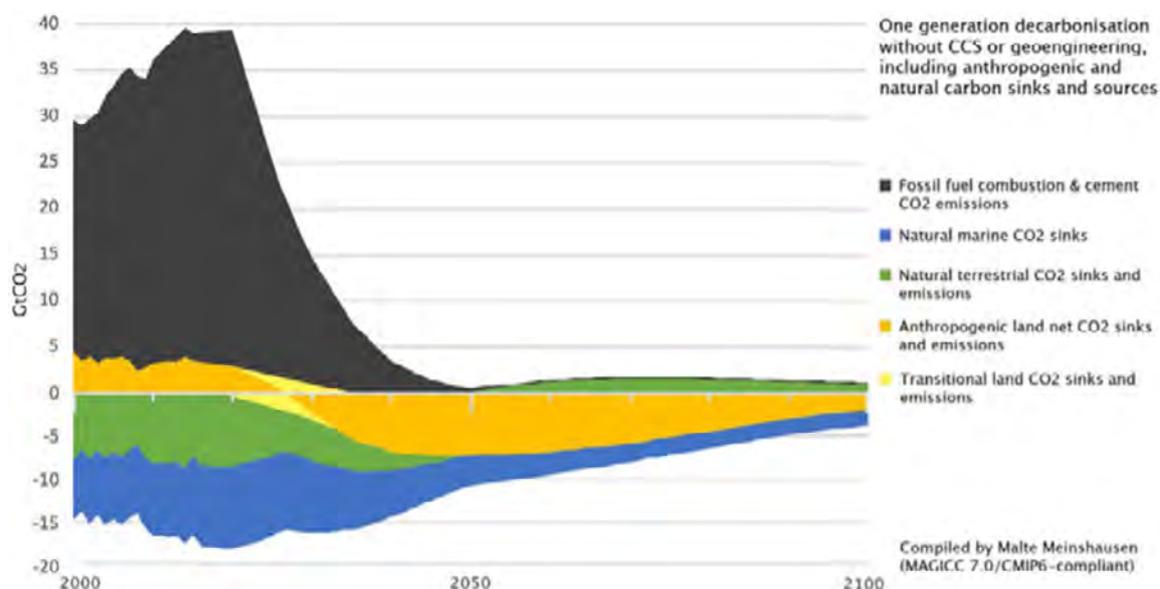
Beginning in Q1 2020 and following a period of consultation with various climate modelling organizations, NZAOA collaborated with the University of Technology Sydney’s Institute for Sustainable Futures on its One Earth Climate Model (OECM). OECM has been used as a first reference case against which NZAOA signatories could set sector targets at five-year intervals to 2050 across all economic sectors and geographic regions (including regional data for North America and Europe).

⁵ In progress (*) as of 2022

B60. In September 2023, new and updated data were published. The OECM methodology was expanded in terms of both its geographic spread and its sectoral graduality. The main changes include:

- Higher technical granularity of the chemical and steel sectors
- Data for all individual G20 countries

B61. The 1.5°C scenario is based on the goal of limiting global warming to 1.5°C (drawing on scenarios that underpin the IPCC’s Special Report on Global Warming of 1.5°C) and the scientific consensus around the severe risks associated with global warming even at 1.5°C (and which will continue to increase significantly beyond 1.5°C). The scenario aims to achieve a global energy-related CO₂ emissions budget of around 426 gigatons (Gt), accumulated between 2020 and 2050. The OECM (Teske *et al.*, 2020) shows that the 1.5°C target can be achieved through a rapid transition to 100 per-cent renewables by 2050, with renewables needing to hit 74 per cent of the global power generation mix by 2030 under the model. The shift to renewable energy will need to be coupled with a major conservation effort to increase the resilience of natural ecosystems and boost food security. This includes a moratorium on land conversions by 2030 and nearly 86 GtCO₂ of ‘emissions removed’ via afforestation and land restoration (shown in gold below the zero line), which pull CO₂ out of the atmosphere and store it in trees and the soil.



B62. **Figure IV:** One Earth Climate Model

B63. The OECM is based on a modelling cluster that provides sector-specific, five-year targets compatible with a 1.5°C pathway. The model is based on the following assumptions:

- Development of a 100 per-cent renewable energy scenario;
- Decarbonization of the entire global energy sector within one generation (until 2050); and

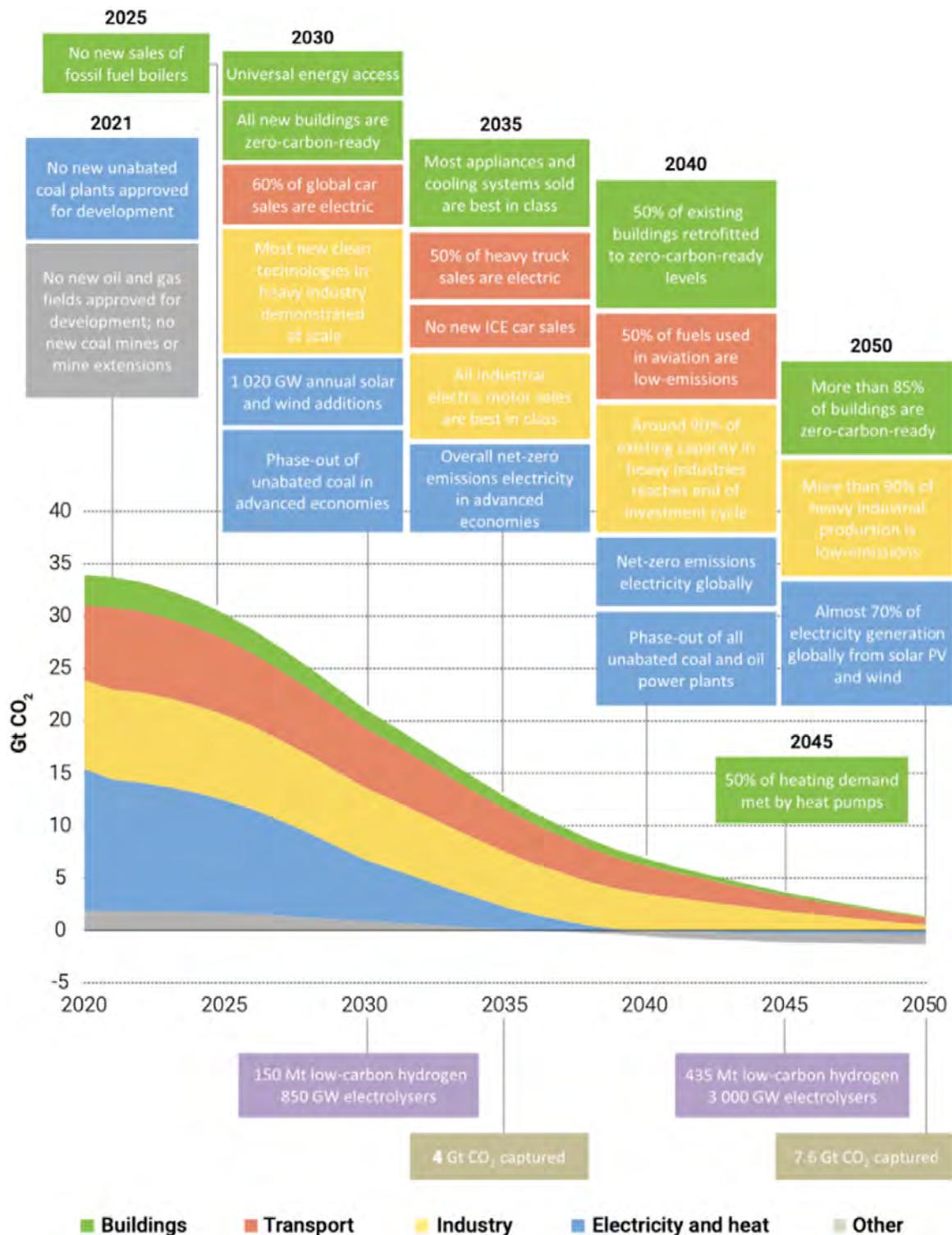
- Use only of technologies currently available or under development, excluding bioenergy with carbon capture and storage (BECCS), carbon capture and storage (CCS) and nuclear energy. Note that the exclusion of CCS technology from the OECM model used to set sector targets might differ from the approach used by other organizations. OECM also includes methane emissions resulting from the mining and extraction of fossil fuels.

The net-zero pathways derived from OECM have been peer reviewed by a number of climate modelling organizations, including the Energy Transition Commission, Exponential Roadmap, the Potsdam Institute for Climate Impact Research, the Science Based Targets Initiative, the Carbon Disclosure Project (CDP), and the environmental non-profit WWF.

4.2.4 The International Energy Agency (IEA): Net Zero by 2050, A Roadmap for the Global Energy Sector

B64.

In 2021, the IEA released a special report about how to transition to a net-zero energy system by 2050, while at the same time ensuring stable and affordable energy supplies, providing universal energy access and enabling robust economic growth. In this report, the IEA set out a cost-effective and economically productive pathway, resulting in a clean, dynamic and resilient energy economy dominated by renewables like solar and wind instead of by fossil fuels. The report also examined key uncertainties in reaching net zero, such as the roles of bioenergy, carbon capture and behavioural changes (IEA, 2021). The IEA NZE2050 scenario includes an overall carbon budget of 460GtCO₂ (CO₂-only) for global energy-related and industrial processes only.



B65. **Figure V:** Key milestones in the pathway to net zero

4.2.5 Comparison between the IEA Net Zero Roadmap and the OECM 1.5°C sector pathway

To aid NZAOA signatories in their assessment and application, the main differences between the OECM and the IEA Net Zero Roadmap are outlined below.

B66.

One Earth Climate Model (OECM)

OECM is an SSP 1 scenario as defined by the IPCC: SSP 1 is a scenario in which social, business and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the southern hemisphere. A downsized energy system enables rapid decarbonization of energy supply. Afforestation is the only carbon dioxide removal option considered; neither fossil fuels with CCS nor BECCS are used.

OECM avoids a carbon budget overshoot and expands 'natural carbon sinks' (e.g. forest, mangroves and seaweed) to achieve negative emissions so as to compensate process emissions that are currently unavoidable (with available technologies at present).

Key features

- Cumulative energy-related CO₂ emissions 2020–2050: 426 GtCO₂. Overall cumulative negative emissions via natural carbon sinks: (-) 94 GtCO₂ (2020–2100). The OECM takes into account 50 different GHGs, including over 30 chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HFCs) as well as black carbon.

Reporting

All GHG emissions are separated:

- Data are split into primary and secondary energy emissions, as well as emissions from end-use activity. Data for 12 industry sectors are in line with the Global Industry Classification Standard (GICS).
- Data are disaggregated by region: Global, OECD North America, OECD Europe (all G20 countries and EU27). The OECM also provides carbon emissions data and product-level intensity data as well as energy-demand data per sector (Teske, 2023).

B67.

IEA Net Zero by 2050 scenario

The energy pathway of IEA Net Zero by 2050 scenario classifies (partly) as an IPCC SSP 2 scenario, which is defined as "a scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal acceptability for BECCS". Land-use scenarios and all other non-energy GHGs (including over 30 substances that fall under the Montreal Protocol) are not included.

Key features

The Net Zero Emissions by 2050 Scenario (NZE) is designed to show what is needed across the main sectors by various actors, and by when, for the world to achieve

net-zero energy-related and industrial-process CO₂ emissions by 2050. Cumulative global energy-related and industrial-process CO₂ emissions between 2020 and 2050 amount to just over 460Gt. The NZE also aims to minimize methane emissions from the energy sector. Alongside, it includes corresponding reductions in GHG emissions from outside the energy sector, consistent with limiting the global temperature rise to 1.5°C without a temperature overshoot (with a 50 per-cent probability). Universal access to sustainable energy is also achieved by 2030.

Reporting

The NZE covers all energy related and industrial process emissions, but does not split between Scope 1, 2 and 3 emissions. It does not specify all regions and industry sub-sectors, nor does it use the GICS categories. As demonstrated above, a detailed quantitative comparison is not possible; however, key differences are outlined below.

B68. **Table IV:** Comparison of OECM versus IEA NZ2050 scenario

IEA Net Zero Scenario ⁶	OECM—Energy pathway
Aside from projects already committed as of 2021, no new oil or gas fields, or coal mines or mine extensions should be approved for development after 2021.	Existing oil and gas fields and coal mines are phased out at an average annual decrease rate of at least 8.5%, 3.5%, and 9.5%, respectively. New fossil fuel projects cannot go ahead.
Use of fossil fuel falls from almost 80% of global energy supply in 2021 to just over 20% in 2050. CC(U)S is used after 2030 for coal, gas, and bio energy fuelled plants.	Fossil fuels will account for just under 8% of total energy supply in 2050 (for non-energy use only).
No new investment decisions should be taken for new unabated coal plants, the least efficient coal plants should be phased out by 2030, and any remaining coal plants should be retrofitted with CCUS by 2040.	No new investment in fossil power plants after 2030, and coal power plants—including combined-heat and power (CHP)—will be phased out between 2030 and 2035 in OECD countries, and between 2035 and 2045 in developing countries.
Emissions reductions through to 2030 rely on existing technologies, but, by 2050, 46% of emissions reductions come from technologies that are currently at the demonstration or prototype phase.	Emissions reductions are almost completely driven by the shift to existing renewable energy technology, with some new technological development needed to assist the transition to electric vehicles, biofuels, and hydrogen in the industry and transport sectors.
Carbon Capture, Utilisation and Storage (CCUS) will capture 7,600 Mt CO ₂ per year by 2050. Of this, 5,245 Mt will be from fossil fuels and processes (including power, industry, and hydrogen production), 1,380 Mt from bioenergy (e.g. BECCS), and around 1,500 Mt from DACS technologies. IEA: approx. -120 Gt until 2050 (cumulative); no data for 2100.	BECCS and CCUS are both excluded from the analysis due to their lack of commercial viability. Reforestation begins immediately, and deforestation ends by 2030. Nature-based carbon sinks (forests, mangroves, and seaweed) are used instead of CCS to compensate for process emissions. OECM: -5 GtCO ₂ by 2050/-94 GtCO ₂ (cumulative until 2100).

6 Comparison is based on IEA Net-Zero Scenario 2021

Hydrogen production will be scaled up to be used as fuel in sectors such as shipping, air travel and heavy industry, with a total of 11 EJ/a produced by 2050.	Renewable generated hydrogen will supply 4% of final energy use (14 EJ/a) by 2050), mainly for industrial process heat.
Electricity will account for almost 50% of total energy consumption in 2050, and total electricity generation will increase by 250% from 2021. IEA: Total global power generation in 2050: 72,000 TWh.	Electricity will account for around 64% of total energy consumption in 2050. Electricity generation will increase by 206% until 2050, based on 2020 levels. OECM: Total power generation in 2050: 94,515 TWh/a (2020: 26,700 TWh/a), Final electricity demand in 2050 64.988 TWh/a (2020: 22,112 TWh/a)
Almost 90% of global electricity generation in 2050 comes from renewable energy. Solar and wind account for 70%. Two thirds of total energy supply in 2050 is from renewables, with solar accounting for one fifth of total global energy supply.	Renewable energy will generate 100% of electricity. It will also comprise 100% of total energy supply, with solar accounting for one third of this. Any remaining fossil fuels will only be used for non-energy uses, such as the petrochemicals industry.
Solar generation capacity is expected to increase 20-times between now and 2050, and wind capacity by 11 times.	Between 2020 and 2050, solar and wind generation are expected to increase by 35 times and 24 times, respectively.
Annual rate of energy intensity improvements of around 4% per year to 2030.	While the rate differs per region, this report assumes a comparable global average rate of energy-intensity improvements to the IEA.
Total global final energy demand in 2050 is around 17% less than 2020.	Total global energy demand is 11% higher than in 2020.
Bioenergy will be deployed for aviation, shipping, cooking, and replacing natural gas with biomethane to provide heat and electricity. Bioenergy will produce 102,000 PJ/a by 2050.	Sustainable biomass will produce 87 EJ/a in 2050. It will primarily be used for process heat and aviation.
The biggest innovation opportunities are in the areas of advanced battery storage, hydrogen electrolysis, and direct air capture and storage (DACs).	No reliance on "breakthrough" technologies such as BECCS or DACS. Instead, the focus is on technologies that are already market-ready, including technologies that may still evolve and fall in cost over time due to economies of scale.

Source: NZAOA Protocol Annex (with contributions from Dr. Sven Teske)

B69.

World Economic Forum's Mission Possible Partnership

The Mission Possible Partnership (MPP) is a coalition of public and private partners working on the industry transition to set heavy industry and mobility sectors on the pathway towards net zero emissions by mid-century. MPP is comprised of four core partners: the Energy Transitions Commission, Rocky Mountain Institute, the We Mean Business coalition and the World Economic Forum (WEF). It focuses on developing partnerships to deliver key initiatives for enabling industries to achieve net zero CO₂ emissions, including aviation, circular cars, heavy-duty road transport, shipping, aluminium, chemicals, cement and concrete, and iron and steel. Sector pathways will be reviewed when made available to NZAOA.

B70.

Sectoral intelligence received from sector participants

To reality check the top-down sector pathways, NZAOA will also employ a bottom-up approach. This includes, but is not limited to:

- **Sector dialogues:** As companies converge around intensity-based or CO₂ emissions per production unit, it is possible to begin to identify those that are ‘on the mark’ and those that fall short. Through sector dialogues, the “climate change sector leaders” will be used for reality checking the net-zero targets.⁷
- **Gap analysis:** The Transition Pathway Initiative (TPI) and other initiatives and data providers have collected targets for the high-emitting sectors. These data will be used for a gap analysis of where the selected high-emitting sectors are today and will be compared to what science deems necessary for achieving net-zero pathways. The results will feed into sector, company and policy engagement.
- **Reference to other sector pathways:** Where sector pathways are not derived from an economy-wide model, but rather developed per sector, NZAOA will also compare the individual sector pathways. For example, the Science Based Targets initiative (SBTi) has produced a 1.5°C pathway for the power sector. The results from these sector decarbonization pathways will be compared to the top-down sector pathways ‘corridor’ derived from OECM and the IEA.

4.3 Financial sector classification

Table IV below outlines a classification of main CO₂-emitting activities, intended as reference. The final selection of codes should align with an institution’s sector-specific segmentation and data availability. The list of codes is indicative and asset owners are invited to also consider other codes, such as the PCAF database, EXIOBASE.

B71.

Table V: Sector classification⁸

Oil & gas		
Proposal financial sector—oil & gas		
NACE	B—Mining and quarrying	B6 Extraction of crude petroleum and natural gas
		B9 Support activities for petroleum and natural gas extraction
	C—Manufacturing	C19 Manufacture of coke and refined petroleum products
	D—Electricity, gas, steam and air conditioning supply	D35.2 Manufacture of gas; distribution of gaseous fuels through mains
D35.2.1 Manufacture of gas		
BICS—Bloomberg	13—Energy	1310 Oil & gas

⁷ OECM Sector Pathways to Net Zero

⁸ Notes on the table: Activities linked to gas distribution are categorised under ‘Gas Utilities’, while activities linked to coal are comprised under “Utilities”.

GICS—S&P and MSCI	1010—Energy	101010 Energy Equipment & Services
		101020 Oil, Gas & Consumable Fuels
Utilities		
Proposal financial sector—utilities/electric generation and distribution		
NACE	B—Mining and quarrying	B5 Mining of coal and lignite
		B8 Other mining and quarrying
		B9 Mining support service activities
		B9.9 Support activities for other mining and quarrying
	D—Electricity, gas, steam and air conditioning supply	D35.1 Electric power generation, transmission and distribution
		D35.3 Steam and air conditioning supply
	E—Water supply; Sewerage, Waste Management and Remediation Activities	E38.2 Waste treatment and disposal
		E38.21 Treatment and disposal of non-hazardous waste ⁹
	BICS—Bloomberg	20—Utilities
GICS—S&P and MSCI	5510—Utilities	551010 Electric Utilities
		551030 Multi-Utilities
		551050 Independent Power Producers & Energy Traders
	1010—Energy	101020 Oil, Gas & Consumable Fuels
		10102050 Coal & Consumable Fuels
Proposal financial sector—utilities/gas		
NACE	D—Electricity, gas, steam and air conditioning supply	D35.2 Manufacture of gas; distribution of gaseous fuels through mains
		D35.2.2 Distribution of gaseous fuels through mains
		D35.2.3 Trade of gas through mains
BICS—Bloomberg	20—Utilities	201011 Gas and Water Utilities
		20101110 Gas Utilities
GICS—S&P and MSCI	55—Utilities	551020 Gas Utilities

9 Including only activities for disposal of non-hazardous waste by combustion or incineration or other methods, with or without the resulting production of electricity or steam, compost, substitute fuels, biogas, ashes or other by-products for further use etc

Proposal financial sector—utilities/water				
NACE	E—Water supply, sewerage, waste management and remediation activities	E36 Water collection, treatment and supply		
BICS—Bloomberg	20—Utilities	201011 Gas and Water Utilities 20101111 Water Utilities		
GICS—S&P and MSCI	55—Utilities	551040 Water Utilities		
Transport				
Proposal financial sector—transportation/airlines				
NACE	H—Transporting and storage	H51 Air transport H53 Postal and courier activities		
	C—Manufacturing	C30 Manufacture of other transport equipment C30.3 Manufacture of air and spacecraft and related machinery		
BICS—Bloomberg	17—Industrial	171112 Transportation & Logistics 17111210 Airlines 17111211 Air Freight		
		GICS—S&P and MSCI	2030—Transportation	203010 Air Freight & Logistics 203020 Passenger Airlines 203050 Transportation Infrastructure 20305010 Airport Services
				Proposal financial sector—transportation/light and heavy road transport
NACE	H—Transporting and storage			H49 Land transport and transport via pipelines H49.1 Passenger rail transport, interurban H49.3 Other passenger land transport H49.4 Freight transport by road and removal services
	C—Manufacturing			C29 Manufacture of motor vehicles, trailers and semi-trailers C30 Manufacture of other transport equipment
BICS - Bloomberg	17—Industrial	171112 Transportation & Logistics 17111215 Trucking		
	11—Consumer Discretionary	111011 Automotive		

GICS—S&P and MSCI	20—Industrials	203040 Ground Transportation (New Name)					
		203050 Transportation Infrastructure, 20305020 Highways & Railtracks					
	25—Consumer Discretionary	2510 Automobiles & Components					
Proposal financial sector—transportation/shipping							
NACE	H—Transporting and storage	H50 Water transport					
	C—Manufacturing	C30 Manufacture of other transport equipment C301 Building of ships and boats					
BICS—Bloomberg	17—Industrial	171112 Transportation & Logistics 17111215 Marine Shipping					
		GICS—S&P and MSCI	2030—Transportation	203030 Marine Transportation 203050 Transportation Infrastructure, 20305030 Marine Ports & Services			
Materials							
Proposal financial sector—materials/cement							
NACE	C—Manufacturing	C23.5 Manufacture of cement, lime and plaster C23.5.1 Manufacture of cement C23.5.2 Manufacture of lime and plaster C23.6 Manufacture of articles of concrete, cement and plaster C23.7 Cutting, shaping and finishing of stone C23.9 Manufacture of abrasive products and non-metallic mineral products n.e.c.					
		B—Mining and quarrying	B08 Other mining and quarrying B0811 Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate B089 Mining and quarrying nec [Suggestion to add]				
			BICS—Bloomberg	18—Materials	181011 Construction Materials 18101110 Cement & Aggregates 18101111 Building Materials 181011111 Concrete Products		
					GICS—S&P and MSCI	15—Materials	151020 Construction Materials

Proposal financial sector—materials/steel		
NACE	B—Mining and quarrying	B07 Mining of metal ores
	C—Manufacturing	C24 Manufacture of basic metals
		C241 Manufacture of basic iron and steel and of ferro-alloys
		C242 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
		C245 Casting of metals
		C2451 Casting of iron
		C2452 Casting of steel
BICS—Bloomberg	18—Materials	181014 Steel
		181015 Metals & Mining
		18101510 Iron
GICS	15—Materials	151040 Metals & Mining
		15104050 Steel
Proposal financial sector—materials/aluminium		
NACE	C—Manufacturing	C24.4 Manufacture of basic precious and other non-ferrous metals
		C24.4.2 Aluminium production
		C24.5 Casting of metals
		C24.5.3 Casting of light metals
BICS—Bloomberg	18—Materials	181015 Metals & Mining
		18101511 Base Metals
		1810151110 Aluminium
GICS	15—Materials	151040 Metals & Mining
		15104010 Aluminum
Agriculture, forestry, and fisheries		
NACE	A—Agriculture, forestry and fishing	A01 Crop and animal production, hunting and related service activities
		A02 Forestry and logging
		A03 Fishing and aquaculture
BICS—Bloomberg	12—Consumer Staples	121010 Food
		12101010 Agricultural Producers
GICS—S&P and MSCI	30—Consumer Staples	302020 Food Products
		30202010 Agricultural Products & Services

Chemicals		
NACE	C—Manufacturing	C20 Manufacture of chemicals and chemical product
BICS—Bloomberg	18—Materials	181010 Chemicals
GICS—S&P and MSCI	15—Materials	1510 Materials
		151010 Chemicals
Construction and buildings		
NACE	F—Construction	F41 Construction of buildings
		F42 Civil engineering
		F43 Specialised construction activities
BICS—Bloomberg	11—Consumer Discretionary	111012 Home Construction
	17—Industrial	171113 Engineering & Construction
GICS—S&P and MSCI	20—Industrials	2010 Capital Goods
		201020 Building Products
		201030 Construction & Engineering
Textiles and leather		
NACE	C—Manufacturing	C13 Manufacture of textiles
		C14 Manufacture of wearing apparel
		C15 Manufacture of leather and related products
BICS—Bloomberg	11—Consumer Discretionary	111010 Apparel & Textile Products
GICS—S&P and MSCI	25—Consumer Discretionary	2520 Consumer Durables & Apparel
		252030 Textiles, Apparel & Luxury Goods

5. Background information to sub-portfolio targets

5.1 Comparison of absolute and intensity metrics

B72. Using both absolute and intensity metrics to measure and reduce portfolio emissions can be useful for the following reasons:

- Carbon intensity can be a useful tool to inform capital allocation decisions in the construction of decarbonizing portfolios and when measuring progress on carbon emissions by portfolio companies. Therefore, carbon intensity can play a key role in setting the stage for achieving absolute emissions reductions.
- In a given sector, absolute corporate emissions are highly dependent on the size of the corporation. Using a carbon intensity measure allows an investor to compare companies within an industry and select the most carbon-efficient player within that industry, independent of company size.
- NZAOA signatories may be expecting significant growth in their portfolios as a result of shifting capital, good returns, economic growth or simply because they manage products or plans that are in an accretive phase (i.e. contributions exceed withdrawals). The opposite may be true for other signatories. These variations in the asset under management will highly influence absolute portfolio emissions and thus not reflect real decarbonization trends. Here, an intensity metric helps to better mirror the decarbonization efforts on the marginal dollar.

Notwithstanding NZAOA's overarching (absolute) net-zero ambition for 2050, it considers that intensity metrics and intensity-based targets can play an important role in the implementation and management of portfolio decarbonization within asset owners. NZAOA signatories may therefore set absolute or intensity-based targets, particularly in the early years.

If an intensity-based metric is utilized, then signatories should understand, on a disaggregated basis, the portion of the intensity reduction originating from asset purchases and disposals, and those originating from organic emissions reductions generated by assets in a portfolio and that originate from changes in financial metrics. If an intensity-based metric is reported, it is recommended that either revenue or enterprise value/enterprise value including cash (EV/EVIC) is used. Inten-

sity-based targets need to counterbalance economic growth—expressed in gross domestic product (GDP)—to lead to the same absolute emissions reductions as absolute emissions-based targets over the long term. When calibrating their own targets, signatories should be aware of the growth assumption inherent in climate models for the regions in which their portfolio is invested.

B73. Using market cap is common for equity portfolios, but, as most NZAOA signatories are also invested in corporate bonds, NZAOA recommends using EV or EVIC to allocate emissions to the relevant parts of the balance sheet (equity/debt).¹⁰

In general, NZAOA signatories **should** ensure all calculation nominators and denominators are closely aligned; e.g. taking nominal value for bonds in an EV-based calculation as the outstanding debt component in the EV of a company is also based on nominal value. Moreover, less volatile measures will lead to more stable results.

EV and EVIC are closely linked to the financing sources of companies, hence directly linked to the role of investors. This logic can also be applied to real assets, such as real estate and infrastructure, thus allowing a more uniform approach to the total portfolio. On the other hand, revenues are more closely linked to the production output of companies and thus to the source of emissions. In NZAOA’s long-term effort to expand this Protocol to all asset classes, it sees a slight preference for EV/ EVIC based intensity metrics.

B74. **Table VI:** Comparison absolute metrics and intensity metrics

Total carbon emissions (absolute metrics)	Carbon intensity (intensity metrics)
This metric measures the Total Owned Carbon Emissions associated with the underlying investments of a portfolio. The Scope 1, Scope 2, and potentially Scope 3 carbon emissions are attributed based on the equity or debt ownership relative to the Enterprise Value or EVIC, and for equities relative to the Market Cap. ¹¹	This metric represents the volume of emissions attributed to an NZAOA signatory in relation to a specific financial metric. The carbon intensity can be expressed with different denominators.

10 This is also in line with the EU Benchmark Regulation linked to the EU Action Plan on Sustainable Finance and the European Banking Authority’s Regulatory Technical Standards (RTS) consultation.

11 NZAOA notes that market cap would not be a reasonable metric for calculating emissions for fixed income holdings.

<p>Pros:</p> <ul style="list-style-type: none"> ▪ This metric is easily understandable and well known across the investment industry. ▪ It is applicable to a number of asset classes, including real estate, by using the asset value as the denominator. ▪ Links can be easily made back to the total absolute global carbon emission budget available in a 1.5°C scenario. 	<p>Pros:</p> <ul style="list-style-type: none"> ▪ As emissions data coverage improves and new asset classes are added, an intensity metric is more stable and better accommodates baseline adjustment. ▪ The metric can be used on a number of asset classes, including real estate assets. If a signatory selects a combined target, this metric can still be created by using the asset value as the denominator or revenues ▪ This metric can be used to compare the emissions intensity level of different asset classes, portfolios, or even signatories. It is also a useful metric to select the best performers within the same sector should it be necessary to rebalance a portfolio towards a low-carbon tilt. ▪ A quantitative analysis on variation factors can be performed on this metric
<p>Cons:¹²</p> <ul style="list-style-type: none"> ▪ Portfolio growth can outpace the reduction in carbon emissions. Adaptations for M&A and unusual portfolio growth rates are necessary ▪ It is difficult to compare portfolios, both to each other and to a benchmark. 	<p>Cons:¹³</p> <ul style="list-style-type: none"> ▪ The reduction/increase in emissions can be driven by volatility in the economic metric selected as the denominator. ▪ Total emissions can still increase even if the carbon-intensity measure used decreases. ▪ Revenues in high emitting sectors are often directly linked to volatile commodity prices (e.g. oil, gas, and coal).

Source: NZAOA Target-Setting Protocol

5.2 Infrastructure

5.2.1 Infrastructure types

B75.

Table VII: Infrastructure asset types in scope

Infrastructure type	Sub-type examples	General definition
Energy infrastructure ¹⁴	(Carbon-Intensive) Energy infrastructure	Carbon-intensive energy infrastructure are the physical assets that enable large-scale energy generation, such as (upstream) coal, gas, and utilities infrastructure and low-quality distribution infrastructure.
	(Low-Carbon) Energy infrastructure, distribution, and technology	Low-carbon energy infrastructure, distribution, and technology encompass renewables, nuclear, electricity transmission lines, as well as technologies such as advanced electrical metering, smart building systems, power plant control systems, and high-quality distribution infrastructure.

¹² NZAOA recommends the use of debt's nominal value.

¹³ We recommend the use of debt's nominal value for the value of a fixed income investment.

¹⁴ In line with NZAOA's position paper on Oil/Gas/Coal that no new Oil/Coal assets or capacity should be financed, permitted, developed or constructed.

Transportation infrastructure	Rail networks; airports; roadworks (including bridges); public transportation systems; ports	Transport infrastructure refer to the framework that supports the transportation system. They include roads, highway systems for mass transit, public transportation systems, airports, ports, trains, subways, and light rail systems, bridges, and tunnels.
Social infrastructure	Public buildings; hospitals; schools and universities; community housing	Social infrastructure refer to facilities that support social services and include public buildings or works (e.g. courts, schools, social housing).
Water infrastructure	Water treatment; water supply; sewer systems	Water infrastructure include water treatment plants, water supply systems, sewer systems, and sewage treatment facilities.
Communications infrastructure	Telecom utilities	Communication infrastructure refer to the backbone of the communications system upon which various broadcasting and telecommunication services are operated, and include wireless, cable, and satellite networks as well as data centres.
Waste management infrastructure	Landfills; recycling	Waste management infrastructure includes infrastructure for landfills, converting waste to energy (WTE), and recycling or composting.

Source: NZAOA Target-Setting Protocol

5.2.2 Carbon accounting for infrastructure

B76. It is recommended that the carbon emission measurement of infrastructure assets¹⁵ be aligned with the [GHG Protocol](#). NZAOA signatories **should** measure emissions for all infrastructure-related assets, as described in this chapter.

B77. **Greenfield assets and lifetime emissions**
For greenfield assets, NZAOA applies the PCAF Standard for the Financial Industry, which recommends that financial institutions assess the total projected lifetime Scope 1 and 2 emissions (PCAF 2022). Signatories **should** attempt to report lifetime emissions for greenfield energy infrastructure projects. Lifetime emissions for other asset types **should** be reported where possible.

For greenfield assets, it is necessary to distinguish between the different development stages (early development, construction, turn-key). Where an asset owner is the initial sponsor or lender in an early development greenfield infrastructure project, signatories **should** report estimated lifetime Scope 1 and 2 emissions for the asset in the year of contracting (PCAF 2022). They **should** also make an assessment as to whether the purpose of the asset and its lifetime emissions are aligned with (or can be brought in line with) the net-zero ambition by 2050 (considering that the asset's lifetime may go beyond 2050). This can be done using the scenarios discussed in Chapter 5 (and in further detail in the Annex), or other 1.5°C-aligned scenarios/methodologies with no or limited overshoot. For investors based in the European Union,

¹⁵ To improve readability, NZAOA always refers to “infrastructure assets” instead of “infrastructure assets or corporations managing or /and owning infrastructure assets”.

the EU Taxonomy gives guidance for many business activities on how to align with the net-zero ambition (EU Technical Expert Group on sustainable finance 2020).

If an asset owner enters an investment at a later stage (construction or turn-key), signatories **should** report estimated lifetime Scope 1 and 2 emissions for the asset in the year of contracting. For this kind of investment, NZAOA signatories **should** undertake an assessment as to whether the purpose of the asset and its lifetime emissions are aligned with (or can be brought in line with) the net-zero ambition by 2050 (again using scientific solid 1.5°C scenarios with no or limited overshoot).

Existing greenfield investments of any kind invested via a fund structure sit outside the current scope for NZAOA recommendations for an estimate of lifetime emissions. This is due to the low level of influence combined with the fact that most asset owners will not have existing reporting requirements in place. However, NZAOA signatories **should** include reporting criteria with regards to lifetime emissions for future investments via funds and **should** engage current invested fund managers to do so. The reporting of lifetime emissions **shall** be separate to the reporting of annual emissions. Once a greenfield project becomes operational, the signatory **should** report annual operational emissions.

B78. **Brownfield assets**

Projects are often structured including various operational entities (OpCos) that are owned by a holding structure (HoldCo); investors might provide debt on both levels. Other more complex structuring also occurs regularly. Ownership share **should** always be determined via an economically consolidated (virtual) balance sheet (see formula below) of the borrower.



B79. **Figure VI:** HoldCo diagram | Source: NZAOA Protocol

B80. As per PCAF, the asset owner **should** determine their share of each infrastructure asset’s annual emissions based on the ratio between the asset owner’s outstanding amount (numerator) and the total equity and debt of the infrastructure asset (denominator) (see formula below). The outstanding amount being the amount of debt and/or equity provided by the asset owner.

$$\text{Financed emissions} = \sum \left(\left(\frac{\text{outstanding amount}}{\text{total equity} + \text{debt}} \right) \times \text{Infrastructure asset annual emissions} \right)$$

Following PCAF recommendations; in the case of debt, the outstanding amount is defined as the value of the debt that the borrower owes to the lender (i.e. disbursed debt minus any repayments). Meanwhile, in the case of equity, the outstanding amount is the outstanding value of equity that the financial institution holds in the project. It is calculated by multiplying the relative share of the financial institution in

the respective project by the total equity of the respective project's balance sheet. Financial institutions **shall** use either the calendar or financial year-end outstanding amount, provided the approach is communicated and used consistently.

- B81. NZAOA does not recommend the use of revenue as a denominator for infrastructure assets for two reasons: (1) during construction phase revenues are usually zero; and (2) for many regulated assets, the revenues are not directly linked to output/usage measures. For infrastructure concessions, the total value of the concession **shall** be used and **shall** be kept constant during the concession term.

5.3 Real estate

5.3.1 Guidance to net-zero buildings

- B82. The global approach to net zero needs to be translated and addressed at the individual building level to provide concrete guidance to owners as to what the long-term target constitutes and to enable effective measures to be taken to reach that target.

What constitutes a net-zero building is still evolving. Existing definitions¹⁶ can, in general, be divided into those focusing primarily on energy (i.e. a zero or net-zero energy building) and those focusing primarily on carbon emissions (i.e. a zero or net zero emission building)—either operational emissions or both operational and embodied emissions (whole life carbon).

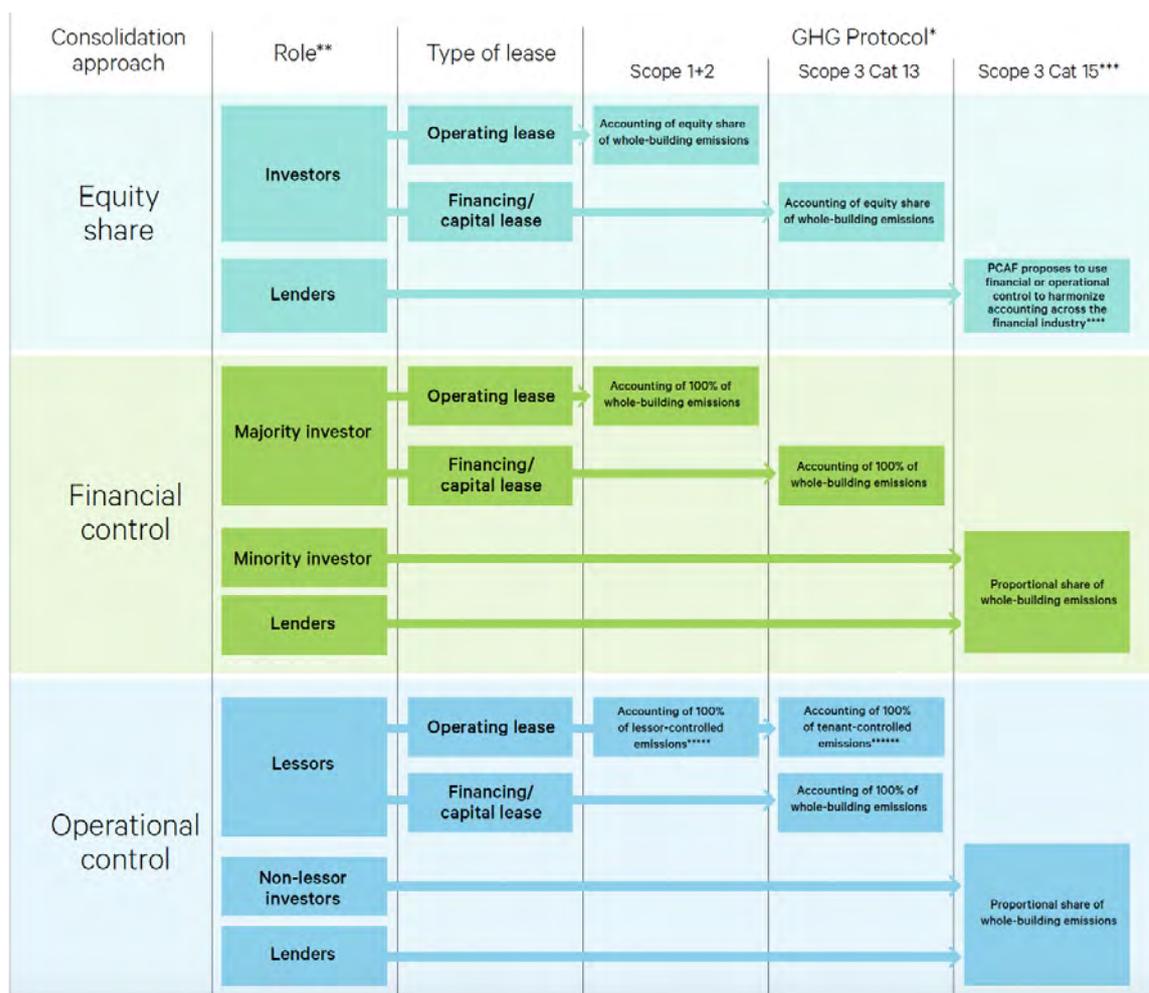
Regarding the definition of a net zero (or zero) operational carbon emissions building, most existing definitions are aligned around two key components: (1) the building needs to be very energy efficient; and (2) the remaining energy that is required comes from on-site and/or off-site renewable sources. About the latter, the IEA also recognizes the concept of a zero-carbon-ready building, which, in addition to being highly energy efficient, uses an energy supply that will be fully decarbonized by 2050 at the latest. What constitutes a very energy efficient building is, in general, not further specified and will depend on the type of building and its geographic location.

It is not the intention of NZAOA to produce yet another definition of what constitutes a net-zero building but rather leverage the existing definitions from credible and well-recognized sources to support its signatories in their efforts to decarbonize their real estate portfolios.

5.3.2 Carbon accounting of real estate assets

- B83. Regarding real estate assets, the delineation of organizational boundaries and the choice of consolidation approach (i.e. equity share, operational control or financial control) have significant influence on the accounting and reporting of carbon emissions (PCAF 2023).

16 Examples would include definitions from the European Commission, the IEA, the World Green Building Council, the OECD and the Global Alliance for Buildings and Construction.



B84. **Figure VII:** Comparison of equity share, financial control and operational control approach (PCAF, 2023)

B85. To align with PCAF, signatories **should** use the operational control approach when accounting carbon emissions in their directly held real estate portfolios (fully or jointly owned). Applying the operational control approach on asset classes such as listed equities or corporate fixed income would result in the investor (or bank) accounting for the company's emissions as financed emissions (i.e. Scope 3, category 15 emissions) as the investor (or bank) does not have operational control. However, within directly held real estate, the application of the operational control will—depending on the role of the investor—distribute emissions across all emission scopes.

B86. The GHG Protocol defines operational control as having “...full authority to introduce and implement its operating policies at the operation”. In the context of building-related emissions, this could be seen from an efficiency-based control perspective or from a consumption-based control perspective. An efficiency-based control would argue that the landlord has control over all building-related emissions, as it often has a far-reaching mandate to introduce efficiency measures across the whole building, including tenant spaces. These measures can relate to examples such as replacing heating, ventilation and air conditioning (HVAC), improving the building envelope, installing a new boiler and so forth. A consumption-based control perspective, in

contrast, looks at the actual consumption, split either by source/contract or by floor space.

B87.

Table VIII: Four different illustrative examples how to account for building-related emissions for different investment types

The examples below are based on the following assumptions:	
Building type:	Office
Common space:	Yes
Tenant space:	Yes
Market value:	EUR 20 million
CO₂e emissions, district heating (DH):	500kg per year
CO₂e emissions, electricity (elec.):	500kg per year
Consolidation approach:	Operational control, source-based split (in this example, it is assumed that the owner/controlling partner has control of heating across both common and tenant spaces and electricity in common spaces)

Investment type	Consolidation	Attribution
Directly held (equity) One investor owns 100% Equity-only financing	Investor/owner has control over: 100% of DH CO ₂ e emissions 10% of elec. CO ₂ e emissions	Investor/owner: 500kg DH CO ₂ e emissions as Scope 2 50kg elec. CO ₂ e emissions as Scope 1/2 450kg elec. CO ₂ e emissions as Scope 3 (cat 13)
Directly held (leveraged) One investor owns 100% 50% loan-to-value ratio	Investor/owner has control over: 100% of DH CO ₂ e emissions 10% of elec. CO ₂ e emissions Bank has control over: 0% of DH CO ₂ e emissions 0% of elec. CO ₂ e emissions	Investor/owner: 500kg DH CO ₂ e emissions as Scope 2 50kg elec. CO ₂ e emissions as Scope 1/2 450kg elec. CO ₂ e emissions as Scope 3 (cat 13) Bank: 250kg DH CO ₂ e emissions as Scope 3 (cat 15) 250kg elec. CO ₂ e emissions as Scope 3 (cat 15)

Investment type	Consolidation	Attribution
Joint venture (equity) Four investors with 25% each Equity-only financing	Controlling partner has control over: 100% of DH CO ₂ e emissions 10% of elec. CO ₂ e emissions Non-controlling Partners have control over: 0% of DH CO ₂ e emissions 0% of elec. CO ₂ e emissions	Controlling partner: 500kg DH CO ₂ e emissions as Scope 2 50kg elec. CO ₂ e emissions as Scope 1/2 450kg elec. CO ₂ e emissions as Scope 3 (cat 13) Non-controlling partners: 125kg DH CO ₂ e emissions as Scope 3 (cat 15) 125kg elec. CO ₂ e emissions as Scope 3 (cat 15)
Joint venture (leveraged) Four investors with 25% each Equity-only financing	Controlling partner has control over: 100% of DH CO ₂ e emissions 10% of elec. CO ₂ e emissions Non-controlling partners have control over: 0% of DH CO ₂ e emissions 0% of elec. CO ₂ e emissions Bank has control over: 0% of DH CO ₂ e emissions 0% of elec. CO ₂ e emissions	Controlling partner: 500kg DH CO ₂ e emissions as Scope 2 50kg elec. CO ₂ e emissions as Scope 1/2 450kg elec. CO ₂ e emissions as Scope 3 (cat 13) Non-controlling partners: 125kg DH CO ₂ e emissions as Scope 3 (cat 15) 125kg elec. CO ₂ e emissions as Scope 3 (cat 15) Bank: 250kg DH CO ₂ e emissions as Scope 3 (cat 15) 250kg elec. CO ₂ e emissions as Scope 3 (cat 15)

5.3.3 Pathway selection and required decarbonization

B88. The [Global Pathways](#) developed by the Carbon Risk Real Estate Monitor (CRREM) provide national decarbonization pathways aligned with reaching net zero emissions by 2050 with no or limited overshoot. The pathways are presented on an annual basis up to 2050 for each respective country and different type of building. This level of granularity enables signatories to set their targets either based on a global decarbonization pathway or to construct a customized decarbonization pathway that reflects the geographic and building type specific distribution of their portfolio. Decarbonization targets will differ depending on the type of building and its geographic location.

B89. **Table IX:** Target option 1—Carbon intensity

Metric	Benchmark	Method
kgCO ₂ e/sqm/annum, or tCO ₂ e/sqm/annum	CRREM 1.5°C pathways	Sectoral Decarbonisation Approach (SDA)

B90. For intensity-based targets, signatories

- **Shall** use kilogram (or tons) of CO₂ emissions per square meter (sqm) and year as the target metric. Targets are set on portfolio level using asset level data to aggregate.
- **Should** use CRREM Global pathways as their benchmark and, to the extent possible, the benchmark **should** be constructed by applying the CRREM pathways in such way that it creates an appropriate reflection of the portfolio assets' geographic and building type specific distribution (see section 3.2). Other pathways **may** be used and, if so, the pathway **shall** meet the criteria in being a science-based 1.5°C pathway with no or limited overshoot. Signatories **shall** disclose which benchmark is being used.
- **Should** use the Sectoral Decarbonization Approach (SDA) to calculate and set the target as, among other advantages, it allows for different starting points.
- **Should** use the International Property Measurement Standard (IPMS) standard, specifically IMPS2, when determining the floor area, but **may** use other standards. Signatories **should** use one standard consistently across all assets in scope of the target setting. Signatories **shall** disclose which floor area measurement standard is used.

B91. **Table X:** Target option 2—absolute emissions

Metric	Benchmark	Method
kgCO ₂ e/annum, or tCO ₂ e/annum	1.5°C pathway with no or limited overshoot	Absolute reduction

B92. For absolute targets, signatories

- **Shall** use an absolute reduction method with kilograms (or tons) of carbon emissions as the target metric. Targets are set on portfolio level using asset-level data to aggregate.
- **Shall** use a pathway that meets the overall NZAOA criteria in being a science-based 1.5°C pathway with no or limited overshoot. The CRREM Pathways can be used by applying the percentage reduction in the carbon intensity between the target year and the base year. If CRREM pathways are used, the benchmark **should** be constructed by applying the CRREM pathways in such a way that it creates an appropriate reflection of the portfolio assets' geographic and building type specific distribution. Signatories **shall** disclose which benchmark is being used.

5.3.4 Energy efficiency

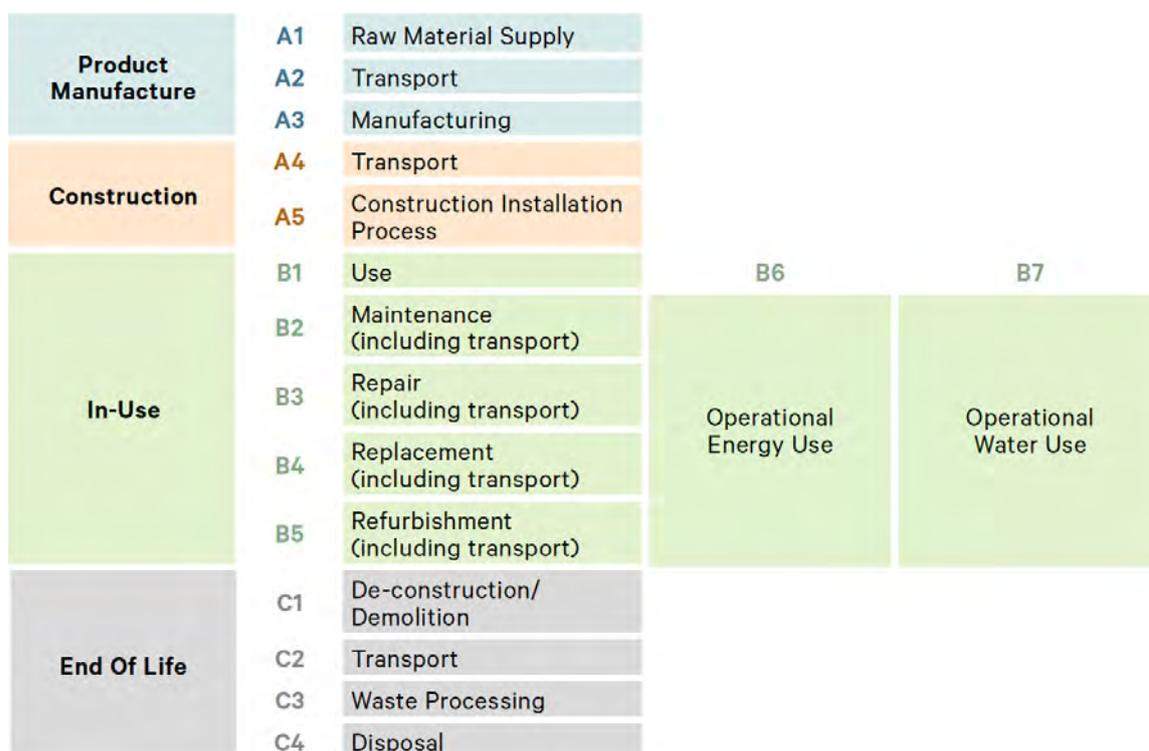
B93. Reducing energy consumption and improving energy efficiency are central components and levers in reducing the emissions from a building. A certain level of decarbonization can be achieved without an explicit focus on reducing energy demand; for example, through grid decarbonization, use of Renewable Energy Certificates (RECs) and on-site renewable energy installations). However, improving a building's energy efficiency must be a priority in all decarbonization strategies.

Improving energy efficiency in the built environment is also an important contributor in reaching net zero globally. Energy efficiency is key to driving down operational energy demand and in turn reducing operational carbon emissions. According to the IEA, the energy intensity in the buildings sector needs to drop five times more quickly over the next ten years than it did in the past five years in order to align with the Net Zero Emissions by 2050 Scenario. This means that the energy intensity (kilowatt-hour/sqm) must be 35 per cent lower in 2030 compared to 2020 (IEA 2021). The importance of reducing energy consumption is also evident in the EU-Taxonomy, where primary energy constitutes the criterion for substantial contribution to climate change mitigation in activities related to real estate.

Improving energy efficiency will be an important component for all signatories in their efforts to transition their real estate portfolios to net zero emissions.

5.3.5 Embodied carbon

B94. The embodied carbon emissions of an asset are the total GHG emissions and removals associated with materials and construction processes throughout the whole life cycle of an asset (see Figure 2-1 on page 17 of [Technical Guidance](#) by PCAF, CRREM and GRESB).



B95. **Figure VIII:** Building life cycle stages (PCAF, 2023)

- B96. Together with operational carbon, embodied carbon completes the whole life cycle emissions of a building. Embodied carbon can be divided into three phases; upfront carbon, in-use carbon and end-of-life carbon. Upfront carbon is released during the manufacturing and construction of a building (extraction of material, manufacture of building components, transportation of material and components to site, and construction). In-use carbon is released through the maintenance of a building (i.e. repairs and refurbishments). Meanwhile, end-of-life carbon refers to the carbon released when a building is demolished. Embodied carbon accounts for a significant share of the whole-life-cycle emissions for most buildings, especially in regions with highly decarbonized energy sources. It is likely that embodied carbon becomes even more significant as efforts to reduce operational carbon are implemented, such as the decarbonization of the grid and energy efficiency measures.
- B97. As the accounting methodology and data for embodied carbon emissions continue to evolve, NZAOA recommends signatories keep abreast of evolving developments and develop capabilities to track embodied carbon emissions where feasible.

5.4 Sovereign debt

5.4.1 The role of sovereign debt in portfolios

- B98. Sovereigns (governments) have a large role to play in climate change mitigation and adaptation efforts. Sovereign debt is one way in which asset owners are linked with sovereigns. Sovereign debt is a significant asset class for many asset owners and therefore **should** be included in the decarbonization considerations of an investment portfolio. However, investing in sovereign debt is different from investing in corporations or real estate through debt or equity. From a balance sheet perspective, sovereign debt is essential for many asset owners to match their liabilities. It is important to note that there are often regulatory requirements to invest in sovereign debt. This makes decarbonizing a sovereign debt portfolio more challenging compared to a corporate bond or equity portfolio.
- B99. Sovereign debt portfolios also highlight the important role that governments have in enabling asset owners to succeed in their portfolio decarbonization. The relationship of portfolio decarbonization with sovereigns is, at least, twofold: (i) a sovereign portfolio relies on countries not only to deliver expected emissions reductions; but also (ii) it provides the right regulatory framework to allow for, and support, the use of suitable (lower-carbon) alternatives to meet risk requirements and associated legal obligations.

5.4.2 Guiding design philosophy

- B100. NZAOA is supportive of a just and inclusive transition to low-carbon economies. NZAOA also acknowledges that, in general, emerging markets will be more impacted by climate change, while having contributed less to cumulative emitted GHGs and have fewer resources available to mitigate and/or adapt for climate change. This position is also reflected in the Paris Agreement through the 'common but differentiated responsibilities' principle.

As such, NZAOA aims to design its sovereign metrics to have no unintended bias that may result in investments being channelled away from emerging markets.

To support this, a more holistic view covering both production and consumption emissions is needed; production emissions are generally higher for emerging markets, while consumption emissions are generally higher for developed markets.

At this time, however, data for consumption metrics are not always readily available. To continue to make progress towards a net-zero world, signatories **shall** use production emissions in line with PCAF’s standards and **should** use consumption-based emissions, when data are available.

5.4.3 Scope definition

B101. The accounting methodology below is based on PCAF’s Global GHG Accounting and Reporting Standard Part A–Financed Emissions. The GHG Protocol’s definition of Scope 1, 2 and 3 emissions that was initially developed for classification of corporate emissions is used analogously for sovereigns (see Table X below). In the absence of a breakdown of Scope 2 and 3 emissions, these may be reported as one combined number. However, Scope 1 emissions **shall** always be reported stand-alone.

B102. **Table XI:** Definition of Scope 1, 2 and 3 for sovereigns

Scope 1	Scope 2	Scope 3
Includes domestic GHG emissions from sources located within a country’s territory.	Includes GHG emissions occurring as a consequence of the domestic use of grid-supplied electricity, heat, steam and/or cooling that is imported from another territory	Includes emissions that are attributable to non-energy imports as a result of activities taking place within a country’s territory.

B103. Under this approach, a sovereign is seen primarily as a national territory and its direct Scope 1 GHG emissions are attributable to emissions generated within its boundaries (production emissions, as defined by UNFCCC).

Scope 2 are emissions attributable to the purchase (in this case, the import) of electricity, steam, heat and cooling from outside the country territory.

Finally, Scope 3 emissions are related to all other (non-energy) imports from goods or services from outside a country’s territory as a result of activities taken place in that country’s territory.¹⁷ On Land Use, Land Use Change and Forestry (LULUCF) emissions, these are often excluded from reported production emissions as they are not consistently accounted by sovereigns or their data providers.

¹⁷ Note, to the best knowledge of NZAOA Scope 2 and 3 data is frequently only available for OECD countries.

5.4.4 Definition production and consumption-based emissions

- B104. NZAOA is following PCAFs definition of production and consumption emissions.
- Production emissions: domestically produced emissions, including domestic consumption and exports
 - Consumption emissions: includes the demand side of sovereign emissions by accounting for consumption patterns and trade effects

- B105. The relation between production emissions and consumption emissions can be defined using PCAF:

$$\text{Consumption Emissions} = \text{Production emissions} - \text{Exported emissions} + \text{Imported emissions}$$

Scope 1 emissions align with production emissions and the territorial emissions approach defined by UNFCCC, while Scope 2 emissions align with energy-related imported emissions. Meanwhile, Scope 3 emissions are associated with all other (non-energy) imports from outside of a country's territory. The relationship between the three can be summarized into the following equation:

$$\text{Consumption Emissions} = \text{Scope 1} + \text{2} + \text{3} - \text{Exported emissions}$$

5.4.5 Rationale for attribution

- B106. A financial institution's share of emissions shall be proportional to the size of its exposure to a borrower's total value. Applying this rationale to countries is challenging because there is no appropriate measurement of a sovereign's financing sources (i.e. an equivalent of enterprise value for corporations). Outstanding sovereign debt is not a fair indication of a country's total value, as sovereigns may finance themselves through both debt and tax revenues. Hence, PCAF has decided for comparison reasons to require an alternative approach that allows for emissions attribution to be linked to the real-economy impact. For this reason, it takes GDP (i.e. the value of a country's output) adjusted for purchase power parity (PPP) as a proxy for the 'value of the country'.

- B107. There is no simple causal relationship between a financial institution's investment and a sovereign's GDP. Empirical evidence suggests that, while there is limited interdependence between sovereign debt and emissions, a country's output production is linked more closely to its generated emissions. Therefore, as financial institutions' funds typically spur economic and therefore GDP growth, this implies an impact on production processes and therefore also on emissions.

5.4.6 The importance of assessing sovereign debt

- B108. Countries' emissions represent all emissions no matter how they are financed or whether they are generated by corporations, individuals or other enterprises domiciled in the countries in question. Relying solely on emissions data will therefore provide an incomplete understanding of a sovereign's climate alignment.
- B109. Understanding a country's policies and alignment may be prudent as an indicator of a sovereign's actions in creating an environment to support and fund transitional

projects, whether these be directed at new clean energy generation, the decarbonization of existing industry or other innovations such as direct carbon capture.

B110. Sovereign governments rely on asset owners to invest in their countries. This mutual relationship introduces the opportunity for NZAOA signatories to engage with sovereigns, creating the potential for a broader conversation.

5.4.7 Data sources and scorecard assessment methodology

B111. The Assessing Sovereign Climate-related Opportunities and Risks (ASCOR) project is a free, open-sourced investor framework and database that seeks to assess the climate action and alignment of sovereign bond issuers. It is developed by an international coalition of asset owners and asset managers in collaboration with an academic partner, the TPI. The methodology was finalized in November 2023, with data from a pilot study of 25 countries published in December 2023. Starting in 2024, the ASCOR project established the aim of annually updating its database with assessments of sovereign-debt-issuing countries, as well as expanding its country coverage and making its assessments publicly available online.

B112. NZAOA believes that using the framework and data made available through the ASCOR project will help create consistency and harmonization on the methodology for climate assessment of sovereign debt holdings for signatories. As the same time, it will reduce the burden of data aggregation through use of the ASCOR database. The ASCOR database allows investors to assess governments' climate-related commitments, their climate-relevant policy frameworks and the actions that they are taking to ensure that the benefits of both a low-carbon transition and of climate adaptation are shared amongst their citizens.

B113. The framework is composed of three pillars containing different themes and sub-categories, each of which includes 'Yes' or 'No' indicators and, where relevant, complementary quantitative metrics.

- Emission pathways (EP): This pillar considers historical emission trends and the alignment of forward-looking national emission reduction targets with international climate goals.
- Climate policies (CP): This pillar considers national policymaking efforts to mitigate emissions, adapt to climate change and ensure a just transition.
- Climate finance (CF): This pillar considers the financing that countries may need in order to implement their climate goals. These indicators are critical given that many countries facing the greatest climate-related risks currently have insufficient access to financing.

Pillar	Area	Indicator	Metric
Broad ASCOR theme (e.g. emissions pathways)	Specific area of climate performance (e.g. EP1. emission trends)	Binary question about the country's performance on a specific action (e.g. EP1.a)	Quantitative metric to provide context for some indicators (e.g. EP1.a.1)

B114. **Figure IX:** Elements of ASCOR framework structure | Source: ASCOR (2023)

- B115. By creating an equal-weighted scoring system on the area level by scoring each indicator in a binary method (i.e. “Yes” equals to “1”, and “No” equals to “0”, and excluding “No data”, “Exempt” and “Not applicable”) in the ASCOR framework, NZAOA aims to arrive at a quantitative aggregate to be used as a sovereign’s score. The portfolio score is calculated using the market value-weighted average of each sovereign score.
- B116. While not required for reporting to NZAOA, signatories are encouraged to utilize the underlying data made available by ASCOR in order to make an informed judgment of each sovereign.
- B117. For more detailed data relating to sovereign emissions, it is recommended that signatories consider the following sources:
- [PRIMAP by Potsdam Institute \(PIK\)](#)
 - [Climate Change Performance Index](#)
 - [Climate Action Tracker](#)
 - [Climate NDC Policy tool](#)
 - [Climate Watch](#)
 - [OECD Climate Action Dashboard](#)
 - [Global Carbon project](#)
 - [UNFCCC—Annex I countries](#)
 - [OECD—Embodied carbon](#)

5.4.8 Guidance on monitoring methodology

- B118. Assessing climate alignment of sovereign debt is more nuanced than corporate assets. As issuers of debt, sovereigns also play an important role as stewards of national policy, infrastructure and development. Thus, historical trends in the emissions financed by a sovereign cannot provide a complete picture of its climate performance.
- B119. Relying solely on past emissions performance disadvantages sovereign debt issuers of emerging markets. These countries are likely to have contributed less to cumulative global emissions. They may be in earlier stages of development, where emissions intensity may be higher, and they may have fewer resources to adapt and transition. Relying on the traditional financed emissions metric for sovereign debt portfolios may result in the unintended displacement of portfolio allocation from emerging to developed markets. In turn, this could exacerbate the resource constraints of emerging markets in their transition to a low-carbon economy.
- B120. To address this complexity, NZAOA encourages signatories to use the data from the ASCOR scorecard to voluntarily monitor their sovereign debt portfolio. This set of metrics is specified to:
- Promote **transparency** in how sovereigns communicate their plans and progress toward their climate goals
 - Support **engagement** with relevant government departments and agencies (such as treasury departments, ministries of environment or their local equivalents) to address implementation and maintenance of climate-related policies.

- Discourage **unintended divestment** from emerging markets by incorporating additional policy-related considerations captured in the indicators of the ASCOR assessment score.

B121. Target-setting on sovereign debt is not required, as NZAOA recognizes the constraints on the limited existing data available for the ASCOR project and the diverse purposes of sovereign debt holdings in asset owners' portfolios.

B122. NZAOA proposes the use of the following Instantaneous Change Metric: ASCORe Improvement

B123. **ASCORe improvement:** For a portfolio with weight w_i for bond holdings of sovereign i that has an ASCORe of A_i , the ASCORe improvement can be defined as:

$$\Delta A = \sum_i w_i \times (A_i - A'_i)$$

Since ASCORes are likely only to have meaningful variations over several years, it is probably sensible to choose to refer to the ASCORe from, say, three to five years prior.

B124. The advantage of using this metric is that it does not encourage divestment from a low-scoring sovereign and its subsequent replacement with a high-scoring sovereign. Instead, it encourages allocation to those sovereigns that show the greatest rates of improvements. This approach is likely to correspond to opportunities for transition finance to have the greatest impact.

It also allows for target setting of the form: an ASCORe Improvement value of at least X over the period from T_1 to T_2 .

6. Policy

B125. A supportive policy environment is critical to the viability of a net-zero transition. Without decisive action by governments to reduce emissions, market incentives to allocate capital in line with a 1.5°C trajectory will remain insufficient.

The private sector, including investors, can play an important role in raising government awareness and making the business case for getting back on track with the Paris Agreement and achieving climate neutrality by the middle of this century.

Asset owners are in a unique position in the financing value chain (especially those setting portfolio targets) and therefore being dependent on change in policy and the real economy. NZAOA Policy Track seeks to amplify investor voices to realize these goals.

B126. **Policy Track working methods**

The Policy Track will operate primarily through:

- Direct engagement with politicians/officials of relevant countries, including on accounting and audit standards and practices;
- Calling for standards (e.g. to ensure integrated reporting);
- Private letter writing to officials from NZAOA signatories;
- Attendance and participating in UNFCCC processes (i.e. participation with the Standing Committee for Finance UNFCCC COP engagements)
- Leveraging multilateral platforms (e.g. UNSC office, the Coalition of Finance Ministers for Climate Action) and key moments (e.g. World Bank meetings/ Climate Action Weeks, Petersburg Dialogue, PRI in Person and IMF annual meetings) to represent NZAOA's ambition.
- Sharing information with NZAOA signatories to consider signing investor statements, where appropriate;
- Letter writing to relevant countries or multilateral fora; and
- Media activities.

B127. NZAOA is committed to policy advocacy as a necessary means to achieve net zero by 2050. Individual signatories are encouraged to engage governments to increase ambition on decarbonization; for example, by participating in The Investor Agenda's annual Global Investor Statement to Governments on the Climate Crisis. While NZAOA establishes global policy positions and advocacy efforts, more contextual policy engagement in specific markets is also encouraged as NZAOA expands in its geographic coverage.

- B128. NZAOA Policy Track has developed a strategy to work on three priorities:
- Advocating for the alignment of interim targets and transition plans with the goal of achieving net zero by 2050;
 - Raising the ambition of sector policies and regulation (real economy and financial sector) to promote the transition; and
 - Implementing mandatory climate reporting and transition plans for companies.

B129. In the execution of this strategy, the track leverages positions developed in other NZAOA tracks, such as when it relates to disclosure recommendations or on engagement where it pertains to existing sectoral policies that hinder the achievement of signatories' ambition in the real economy.

NZAOA also advocates for financial market regulation as well as support frameworks that enable financial institutions to finance the net-zero transition; e.g. disclosure requirements in line with TCFD recommendations, the development of country-specific transition plans and the raising of awareness regarding the impact of climate risks.

B130. **Aligning 2030 emissions reduction targets with net zero-by-2050 goals and pathways**

The most recent round of nationally determined contribution (NDC) submissions required under the Paris Agreement in 2025 saw enhanced commitments and emissions reduction plans. However, NDCs continue to fall short of putting the world on track for 1.5°C. Maximizing opportunities to further advance NDCs and national plans is a key goal for the Policy Track.

Targeted goals include:

- Commitment to enhance current NDCs with 2030 targets that are in line with a trajectory to achieve net zero GHGs by 2050 or sooner from developed countries; and
- Implement net-zero commitments and trajectories via best practice national policy mechanisms, including the enshrining of the net-zero commitment in climate legislation;
- intermediate targets;
- an independent body to monitor and advise government; and
- appropriate carbon pricing regimes as part of a climate policy mix.

B131. **Sector policies to promote transition**

Sector policies are a key component of effective climate policy. As such, NZAOA will advocate for sector policies and regulation consistent with net zero emissions by 2050 or sooner from developed and large emitter countries, complemented by a commitment to a just transition.

Targeted goals include:

- Elimination of direct and indirect fossil fuel subsidies;
- Policy measures (via regulation or carbon pricing or both) to deliver the national phase-out of fossil fuel technologies; e.g. coal-fired power and coal mining, and the sale of new internal combustion engine vehicles;
- No-deforestation, No-peat and No-exploitation (NDPE);¹⁸
- Support for enhancement of natural capital, and a net-zero pathway for agriculture;
- Support for, and potentially redirecting of, subsidies for scale-up of new technologies that will provide solutions in hard-to-abate sectors; e.g. CCS and green hydrogen;
- Sectoral net-zero policies for key economic sectors; namely, energy, power, industry, agriculture, automotive, aviation and shipping; and
- Commitment to develop granular short-, medium- and long-term plans for zero-carbon infrastructure.

B132.

Promotion of mandatory climate reporting and transition plans

NZAOA has provided, and will continue to provide, investor support for meaningful reporting and net-zero transition plans in advanced markets. NZAOA published *'A Tool for Developing Credible Transition Plans'* (NZAOA, 2023c) to aid signatories in developing their own transition plans and assess the transition plans of asset managers and investee companies.

18 Refers to no exploitation of the rights of Indigenous Peoples, workers and local communities.

References

- Assessing Sovereign Climate-related Opportunities and Risks (ASCOR). ascorproject.org
- Assessing Sovereign Climate-related opportunities and Risks (2023). ASCOR framework: methodology note. transitionpathwayinitiative.org/publications/uploads/2023-ascor-framework-methodology-note
- CA100+ Net Zero Company Benchmark: Structures and methodologies. climateaction100.org/net-zero-company-benchmark/methodology/
- Climate Action Tracker: climateactiontracker.org
- Climate Change Performance Index. ccpi.org
- Climate NDC Policy tool. ndcpartnership.org/knowledge-portal/climate-toolbox
- Climate Watch. climatewatchdata.org
- Energy and Climate (2024). Net Zero Scorecard. eciu.net/netzerotracker
- Freshfields Bruckhaus Deringer (2021). A legal framework for impact. public.unpri.org/download?ac=13902
- Glasgow Finance Alliance for Net Zero (GFANZ) (2022). Guidance on Use of Sectoral Pathways for Financial Institutions. assets.bbhub.io/company/sites/63/2022/06/GFANZ_Guidance-on-Use-of-Sectoral-Pathways-for-Financial-Institutions_June2022.pdf
- Global Carbon project: globalcarbonproject.org
- IEA (2021). Net Zero by 2050—A Roadmap for the Global Energy Sector. iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf
- Intergovernmental Panel on Climate Change (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability. Sixth Assessment Report. ipcc.ch/report/sixth-assessment-report-working-group-ii/
- International Labour Organization (2015). Guidelines for a just transition towards environmentally sustainable economies and societies for all. ilo.org/global/topics/green-jobs/publications/WCMS_432859/lang-en/index.htm
- MacLeod, M. & Park, J. (2011). Financial Activism and Global Climate Change: The Rise of Investor-Driven Governance Networks. *Global Environmental Politics*, 11 (2), pp.54–74. DOI: [10.1162/GLEP_a_00055](https://doi.org/10.1162/GLEP_a_00055).
- Marti, E., Fuchs, M., DesJardine, M., Slager, R. & Gond, J. (2023). The Impact of Sustainable Investing: A Multidisciplinary Review. *Journal of Management Studies*, Article joms.12957. DOI: [10.1111/joms.12957](https://doi.org/10.1111/joms.12957).
- Net-Zero Asset Owner Alliance (2021). Inaugural Target Setting Protocol. unepfi.org/publications/inaugural-2025-target-setting-protocol/
- Net-Zero Asset Owner Alliance (2022a). Call to Action to Private Market Asset Managers. unepfi.org/wordpress/wp-content/uploads/2022/11/NZAOA_Call-to-Action-to-Private-Market-Asset-Managers_final.pdf

- Net-Zero Asset Owner Alliance (2022b). The Future of Investor Engagement: A Call for Systematic Stewardship to Address Systemic Climate Risk. [unepfi.org/industries/the-future-of-investor-engagement-a-call-for-systematic-stewardship-to-address-systemic-climate-risk/](https://www.unepfi.org/industries/the-future-of-investor-engagement-a-call-for-systematic-stewardship-to-address-systemic-climate-risk/)
- Net-Zero Asset Owner Alliance (2022c). Net-Zero Asset Owner alliance calls on policymakers to support scaling blended finance. [unepfi.org/industries/net-zero-asset-owner-alliance-call-on-policymakers-to-support-scaling-blended-finance/](https://www.unepfi.org/industries/net-zero-asset-owner-alliance-call-on-policymakers-to-support-scaling-blended-finance/)
- Net-Zero Asset Owner Alliance (2022d). Position Paper on Governmental Carbon Pricing. [unepfi.org/themes/net-zero-asset-owner-alliance-position-paper-on-governmental-carbon-pricing/](https://www.unepfi.org/themes/net-zero-asset-owner-alliance-position-paper-on-governmental-carbon-pricing/)
- Net-Zero Asset Owner Alliance (2023a). Elevating Asset Manager Net-Zero Engagement Strategies. [unepfi.org/industries/elevating-asset-manager-net-zero-engagement-strategies/](https://www.unepfi.org/industries/elevating-asset-manager-net-zero-engagement-strategies/)
- Net-Zero Asset Owner Alliance (2023b). Policy Engagement Guidelines. [unepfi.org/industries/investment/policy-engagement-guidelines/](https://www.unepfi.org/industries/investment/policy-engagement-guidelines/)
- Net-Zero Asset Owner Alliance (2023c). A Tool for Developing Credible Transition Plans: Public edition for asset owner pilot-testing. [unepfi.org/developing-credible-transition-plans-implementation-tool-for-asset-owners/](https://www.unepfi.org/developing-credible-transition-plans-implementation-tool-for-asset-owners/)
- Net-Zero Asset Owner Alliance (2023d). Understanding the Drivers of Investments Portfolio Decarbonization. [unepfi.org/industries/understanding-the-drivers-of-investment-portfolio-decarbonization/](https://www.unepfi.org/industries/understanding-the-drivers-of-investment-portfolio-decarbonization/)
- OECD Climate Action Dashboard. [oecd.org/climate-action/ipac/dashboard?country=DEU](https://www.oecd.org/climate-action/ipac/dashboard?country=DEU)
- Paris Agreement (2015). unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf
- PCAF (2022). Financed Emissions – The global GHG Accounting & Reporting Standard Part A. [carbonaccountingfinancials.com/standard](https://www.carbonaccountingfinancials.com/standard)
- PCAF (2023). Accounting and Reporting GHG Emissions from Real Estate Operations— Technical Guidance for the Financial Industry V1.0. [carbonaccountingfinancials.com/files/downloads/ghg_emissions_real_estate_guidance_1.0.pdf](https://www.carbonaccountingfinancials.com/files/downloads/ghg_emissions_real_estate_guidance_1.0.pdf)
- PRIMAP by Potsdam Institute (PIK). zenodo.org/records/7727475
- Teske, S., Niklas, S., Nagrath, K., Talwar S., Atherton, A. & Guerrero Orbe, J. (2020). Sectoral pathways and Key Performance Indicators: aluminium, chemical, cement, steel, textile & leather industry, power utilities, gas utilities, agriculture, forestry, the aviation and shipping industry, road transport, and the real estate & building industry. [unepfi.org/Sectoral-Pathways-and-Key-KPIs.pdf](https://www.unepfi.org/Sectoral-Pathways-and-Key-KPIs.pdf)
- Teske, S., Rispler, J., Niklas, S., Feenstra, M., Mohseni, S., Talwar, S. & Miyake, S. (2023). Net-zero 1.5 °C sectorial pathways for G20 countries: energy and emissions data to inform science-based decarbonization targets. ink.springer.com/article/10.1007/s42452-023-05481-x
- Transition Pathway Initiative. transitionpathwayinitiative.org
- United Nations Development Programme (2016). Gender and Climate Change— Gender and climate finance. [undp.org/sites/g/files/zskgke326/files/publications/UNDP%20Gender%20and%20Climate%20Finance%20Policy%20Brief%205-WEB.pdf](https://www.undp.org/sites/g/files/zskgke326/files/publications/UNDP%20Gender%20and%20Climate%20Finance%20Policy%20Brief%205-WEB.pdf)
- UNFCCC (2023). Conference of the Parties serving as the meeting of the Parties to the Paris Agreement, Fifth session.
- WRI (2019). The Greenhouse Gas Protocol—A corporate Accounting and Reporting Standard. Revised Edition. [ghgprotocol.org/corporate-standard](https://www.ghgprotocol.org/corporate-standard)



UN-convened Net-Zero Asset Owner Alliance

unepfi.org/net-zero-alliance/