IIGCC

Investing in climate solutions: Renewable energy generation infrastructure

November 2024

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Disclaimer

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About this paper

This paper establishes guidance for investors to consider in their approach to quantifying their contribution to scaling renewable energy generation within the infrastructure asset class. It is the second in a series of asset class-specific climate solutions guidance documents released by IIGCC. This topic has been addressed due to its outsized importance (according to leading climate scenarios) when compared to other climate solutions, in delivering a global transition to net zero in line with the goals of the Paris Agreement.

We expect to develop supplementary guidance on climate solutions, including on the transmission, distribution and storage systems needed to support the renewable generation assets tackled here, in forthcoming work.

Who is this guidance for?

This document provides guidance to assist investors in their considerations of investing in climate solutions, focussing specifically on renewable energy generation infrastructure. It is designed to be consistent with the global goal established at COP28 to triple renewable installed capacity by 2030[1]. The guidance may be of particular use to investors who are following the Net Zero Investment Framework (NZIF) or are updating objectives and targets as part of their commitments to the Paris Aligned Asset Owner (PAAO) and Net Zero Asset Manager (NZAM) initiatives.

Acknowledgements

The guidance reflects discussions held within IIGCC membership, including a dedicated Climate Solutions (Renewable Energy) working group. IIGCC would like to thank the working group co-leads and participants.

IIGCC's Climate Solutions (Renewable Energy) working group co-leads are Brendan Abadie (Phoenix Group) and Inês Cunha Pereira (TPT Investment Management). Participants are Jan-Hein van den Akker (Mercer), Bruno Besek (NN Group), Pablo Carvajal (EY), Rosie French (Schroders Greencoat), Lee Anne Hagel (APG Asset Management), Emile Lavergne (University Pension Plan), Rachael Lem (West Midlands Pension Fund), Roger Lewis (Downing LLP), Stephen Porter (Scottish Widows), Riaan Potgieter (StepStone Group), Katherine Sherwin (BlackRock), Natalie Sinha (UBS Asset Management), Holly Turner (Schroders).

1 See COP28 Presidency communications: https://www.cop28.com/en/global-renewables-and-energy-efficiency-pledge

1 Introduction and context

Alignment with the Net Zero Investment Framework

The Net Zero Investment Framework (NZIF) is the most widely used guide by investors to set individual voluntary objectives and targets and to produce net zero strategies and transition plans[2]. NZIF is an impact-oriented guide, aiming to support investors *financing reduced emissions*, not reducing financed emissions. In line with this philosophy, NZIF outlines two key objectives for investors:

1. **Transitioning investment portfolios** in a way that is consistent with the mitigation goals of the Paris Agreement, focusing on real economy decarbonisation.

2. **Increasing investment** in the range of climate solutions to enable the transition.

On the latter, NZIF recommends that investors set a quantitative, medium-term (< 10 year) objective for scaling up investments in climate solutions[3]. This is on the basis that a transition to net zero in line with credible scientific pathways not only requires the phase down of emissions-intensive activities but also acceleration of low-carbon alternatives (i.e. climate solutions)[4].

Many investors have set qualitative objectives to increase investments in climate solutions. Some, who have set quantitative objectives, have mostly used proportion-based metrics (e.g. % of AUM, fund allocations, or revenue streams) or absolute metrics disclosing a specific sum dedicated to climate solutions, to describe their overall allocation.

Below this overall climate solutions objective, where they wish to, investors can take advantage of specific classifications and metrics to track and set objectives for allocation to climate solutions in different asset classes on a more granular level or conduct asset-level assessments against key activities. The most useful metrics are likely to vary between asset classes, so a dashboard approach is recommended.

2 See full Net Zero Investment Framework

3 In "*Investing in climate solutions: listed equity and corporate fixed income*", IIGCC defines climate solutions as "Activities, goods or services that contribute substantially to, and/or enable, emissions reductions to support decarbonisation in line with credible 1.5°C pathways towards net zero, or that contribute substantially to climate adaptation."

4 See IIGCC's implementation guidance for setting the allocation to climate solutions objective

Box 1: Setting an objective for increasing investment in climate solutions

Climate solutions objective-setting can help investors determine the appropriate ambition, scale and pace at which they are able to operationalise their individual net zero goals and take advantage of investment opportunities.

This will vary for each investor depending on its unique circumstances, including its mandate(s) and investment strategies, and will reflect the investor's wider obligations including its legal and fiduciary duties. For this reason, neither NZIF nor this supplementary guidance seeks to establish specific thresholds or allocations that investors should meet.

As part of their broader approach to determining an appropriate allocation to climate solutions, investors may also wish to consider technology and regional climate solutions pathways generated by integrated climate economy models and/or a scoping assessment of the current market for climate solutions investment opportunities. This assessment might be conducted as part of overall climate risk and opportunity identification[5]. Either of these exercises could be useful to inform decision-making on setting an appropriate climate solutions allocation objective, based on what is needed to support the transition (and therefore what is needed to support investors to achieve their voluntary net zero commitments) and what is currently available in the market, in the context of an investors' own priorities, mandates and fiduciary responsibilities.

Regardless of the approach to determining the objective, internal investment and risk leadership teams (e.g. a Chief Investment Officer, Chief Risk Officer or appropriate delegates) should be involved in the development and approval process such that a practical level of ambition can be set in the context of wider investment strategy and risk tolerance levels. Ultimately, establishing an objective to increase investment in climate solutions assets should be subject to the usual processes that investors use to manage risks when allocating capital.

5 See the Recommendations of the Task force on Climate-related Financial Disclosures

Asset class guidance on investing in climate solutions

This document provides recommended metrics for a subset of the infrastructure asset class: renewable energy generation assets. Renewable energy has been prioritised due to:

a. The central role it plays in decarbonising electricity generation and the economy more broadly; and

b. To support investors to communicate their contributions to the global goal to triple renewable energy capacity by 2030, established at COP28.

Box 2: Renewable energy is fundamental to decarbonising the global economy

Climate scenarios that are aligned with a global transition to net zero emissions by 2050 identify scaling up renewable energy supply as a priority to enable the emissions reductions needed to achieve the Paris Agreement goals[6]. Decarbonising power systems is fundamental to decarbonising many other sectors, such as transportation and industry.

In recognition of this, governments established a new goal at the 28th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) to triple global renewable installed capacity by 2030. Since this, market analysts have estimated that meeting the tripling goal would require a 2.1x increase in annual investments into renewable energy by 2030[7, 8].

How investors can support the tripling renewables goal

The goal calls for a threefold increase in renewable energy installed capacity by 2030. This could be interpreted as most directly linked to the development and construction of new projects. Investments in renewable energy capacity can come from corporate investments, bank investments and investors. Investors typically support these project stages through primary capital.

However, there is also an important role for the secondary markets in providing exit opportunities for development and construction phase investors and then stewarding the assets during their operational lifetime. In this guidance we recognise the role that both types of finance play in achieving the tripling goal – but emphasise the importance of not double counting efforts between the two types of financial activity. Distinct, non-aggregable approaches are recommended for primary[8] and secondary market[9] investors, respectively.

Regardless of the market, all investors have the ability to influence the ecosystem of policymakers, regulators, and other industry stakeholders. This will be an increasingly important mechanism to affect the enabling environment required for increased investment in renewable energy and the transition to net zero.

At the same time, the infrastructure asset class is very diverse. In the future, this guidance is intended to sit within broader climate solutions guidance for the infrastructure asset class.

6 Scenarios from the International Energy Agency (IEA), International Renewable Energy Agency (IRENA) and the Intergovernmental Panel on Climate Change (IPCC).

7 Estimates by Bloomberg NEF from a baseline year of 2022 https://assets.bbhub.io/professional/sites/24/BNEF_2023-11-21_triplingrenewables_Final.pdf.

8 See also IIGCC's Climate Investment Roadmap

9 Markets where securities are created; a source of new securities which provide new capital to companies, projects, or governments.

10 Markets where securities are traded after they have been put up for sale on the primary market.

A four-step approach to climate solutions

This guidance utilises IIGCC's four-step approach to investment in climate solutions[11], as follows:

	Listed Equity and Corporate Fixed Income (published November 2023)	**Infrastructure – Renewable Energy Generation** (this document, published November 2024)
1. Solutions classification	Identify and classify activities, products and services that contribute to emissions reductions using net zero scenarios and/or local taxonomies.	Identify renewable energy generation assets in the portfolio.
2. Contribution type	Assess the type of contribution those activities make to decarbonisation.	Not applicable for this guidance.
3. Asset class indicators	Corporate: Assess contribution of a corporate using revenue and capex data.	Infrastructure: Assess contribution of the asset using capacity, technology type and AUM allocation data[12]. Different data and metrics are recommended for primary and secondary markets investors.
4. Portfolio/fund metrics	Aggregate corporate green activity up to portfolio or fund.	Aggregate or average metrics (depending on metric) up to portfolio or fund.

11 Initially outlined in IIGCC's 'Investing in climate solutions: listed equity and corporate fixed income' guidance

12 The infrastructure component of NZIF broadly defines infrastructure as an asset class to incorporate equity and debt exposure held through direct or co-investments, listed and unlisted infrastructure funds, project finance or passive investments.

2 Scope and boundaries of this guidance

Accelerating the energy transition is expected to require increased investment by a variety of actors along the renewables value chain. This section outlines the specific scope and boundaries of the guidance contained in this document.

The energy value chain

In scope	Not in scope
✓ Generation	× Transmission and distribution (T&D) × Storage × Demand side / end usage × Energy efficiency measures

This guidance covers investments in renewable energy generation only. It does not cover transmission, distribution (grids) and storage, which we will seek to address in future guidance. The reason for excluding T&D and storage from this guidance is that the operational metrics used to measure the climate performance of these investments have yet to be determined and are likely to require a different approach to those used to assess generation. Energy carriers that are produced using renewable energy (e.g. green hydrogen) similarly do not fall into the scope of this guidance but will be covered in future work.

Energy technologies

In scope	Not in scope
✓ Renewable energy generation	× Energy generation from non-renewable sources

This guidance covers all **renewable** energy generation technologies. Investors should consider disclosing the classification system used to identify these technologies, in line with the "solutions classification" step of the four-step process identified in section 1[13]. Classification of renewable energy technologies is further established in the next section of this document but broadly relies on the Energy Taxonomy produced by the International Renewable Energy Agency (IRENA)[14].

13 More detail on classification can be found in IIGCC's implementation guidance for setting an allocation to climate solutions objective.

14 IRENA Energy Taxonomy https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Mar/IRENA_Energy_taxonomy_2024.pdf

Financial markets

In scope	Not in scope
✓ Primary market investors	× Investments or lending by banks
✓ Secondary market investors	× Investments or lending by corporates e.g. electric utilities or oil & gas companies

Investments made through both the primary and secondary markets are in scope of this guidance, recognising that both types of investment will play an important role in providing new capital (primary markets) and supporting the ongoing operation (secondary markets) of these projects, as detailed in section 1.

Banks and corporates are not in scope[15]. This guidance is aimed at asset owners and managers, and does not cover investments made by other entities that provide finance to renewable energy assets, for example banks or corporates in the energy and utilities sectors.

15 Guidance for corporates (and banks) will follow in due course and is likely to incorporate the approach developed here.

3 Objective-setting and supportive disclosures

This section establishes an approach for primary and secondary markets for investors to consider in setting objectives and monitoring performance on scaling renewable energy generation, including contributing to the global tripling renewable energy capacity goal for 2030.

Selection of metrics

A number of metrics could be used for this purpose. Each has different advantages and drawbacks in terms of its utility in describing the ultimate climate impact of the investment, access to data and aggregability (see Annex 1). Installed capacity is proposed here as the priority metric for objective-setting, based on good data availability, aggregability and alignment with the global goal. In this approach, investors who wish to set forward-looking objectives on scaling renewable energy generation are recommended to use installed capacity as the basis for their objective. One key drawback to this metric is that the renewable energy generated by a given unit of capacity (and hence its utility in decarbonising the energy system) varies significantly by technology and location. For this reason, investors are encouraged to disclose a breakdown of total installed capacity by at least technology. Disclosing geographical breakdown is also recommended.

Metrics such as capacity factor and energy generated can provide further context to installed capacity objectives. Whilst it would not be the best approach to set an objective on, for example, the average capacity factor of projects an investor has supported, as capacity factor is affected by broader variables such as intermittency and grid factors, it does help to show how effective projects are in bringing renewable energy to the grid. To reflect this, it is recommended that investors use a suite of metrics in a dashboard-style approach when reporting on progress against the primary capacity-based objective. The utility of these 'optional' metrics will vary depending on the investors' size, access to underlying asset data and investment strategies, amongst other factors, and so it is not expected that all investors will find it useful to calculate all optional metrics. Selection and disclosure of metrics should be consistent with the disclosing party's internal investment decision-making approach.

Including both primary and secondary markets

Primary capital plays an important role in financing the construction of new renewable energy generation assets. While the secondary markets may not provide new capital to projects directly, they also have an important role to play as part of the ecosystem that supports primary finance, as stewards of these projects during their operational phase.

For this reason, different approaches for disclosing capacity are given for primary and secondary markets: but these should be calculated and disclosed separately to each other to avoid double counting. The metric for primary markets uses a cumulative approach because financed capacity can be added up over time as projects will only be built once in the construction stage, so, once attributed, each unit of capacity can be treated as unique. The secondary markets metric uses a point in time approach because multiple investors can be exposed multiple times to the same units of capacity over their lifetime through secondary market activity. A point in time calculation can show the level of renewable energy market activity that the investor has participated in that year, and trends over time, but a cumulative approach cannot be used as these will not always be distinct units of new installed capacity, even once attributed.

Table 1: Metrics for investors to communicate progress in scaling investment into renewable energy generation assets

This table sets out the priority financed capacity metric for objective-setting for primary and secondary market investors. It also establishes a list of additional, optional metrics that could be used to provide further context to monitoring and reporting of progress against objectives. The usefulness and practicality of the optional metrics will vary for different types of investors – not all metrics will be useful for every investor to calculate or report. Annex 1 sets out some of the advantages and drawbacks of the key metrics.

Primary markets	
Priority metric for objective-setting	**Cumulative total financed installed capacity (for assets financed through primary capital), in MW or GW as appropriate.** Where possible, this should be broken down by renewable energy technology as defined in section "200000" of the International Renewable Energy Agency (IRENA) Energy Taxonomy[16]. Where investors are unable to use this classification, they are encouraged to explain why a different approach has been taken.
Supportive disclosures	▪ Average capacity factor across financed assets (unitless ratio) ▪ Financed capacity adjusted by capacity factor per asset ▪ Cumulative total financed generation (measured in kilowatt-hour (kWh) or megawatt hour (MWh), as appropriate) ▪ Pipeline metrics, for example total capital or %AUM allocated to renewable energy project development (e.g. Devex stage) in the development, design and planning of projects pre- Commercial Operation Date (COD).
Secondary markets	
Priority metric for objective-setting	**Annual financed installed capacity (by exposure to assets through secondary capital), in MW or GW as appropriate[17].** This should be reported on an end of year basis to reflect activity from the previous 12 months. Not to be aggregated between multiple investors.
Supportive disclosures	▪ Average capacity factor across financed assets (unitless ratio) ▪ Cumulative total financed generation (measured in kilowatt-hour (kWh) or megawatt hour (MWh), as appropriate)

16 This taxonomy is recommended on the basis that it is an internationally recognised classification of renewable energy technologies specifically. Broader 'sustainability'-related taxonomies typically include other activities that might be sustainable but are not renewable energy. This recommendation is subject to an 'implement or explain' clause: where investors might find it impractical to use this taxonomy, they may use a different renewable energy taxonomy and explain why this has been used. The IRENA Energy Taxonomy can be access here. Only technologies under section "200000 – Renewable Energy" should be identified. Broadly, section 200000 captures renewable hydropower, marine, wind, solar, geothermal and bioenergy. Technologies listed under "100000 – Non-renewable energy" and "300000 – Energy storage" should not be included in this disclosure.

17 To demonstrate ongoing allocation of capital towards scaling and operating renewable energy generation assets.

Approach to attribution

Activity is attributed to individual investors with a standardised metric that draws on the project finance attribution methodology under the Partnership for Carbon Accounting Financials (PCAF) standard[18]. This allows investors to attribute their involvement to financing capacity (and generation), taking into account both debt and equity, whilst avoiding double counting or overstating. The PCAF project finance methodology should be referred to for contextual notes, including treatment of co-investments[19]. Key metrics for the calculations (see below), have also been taken from Lazard's Levelized Cost of Energy to assist with standardisation of inputted data[20]. An approach to attributing generation is also outlined below, for cases where investors may wish to use this as a supportive metric alongside financed capacity.

Calculation 1: Financed capacity

$$Financed\ capacity = \sum \left(Capacity_p \ x \ \frac{Outstanding\ cash\ amount\ of\ investment_p}{Initial\ Cost\ of\ Investment_p}\right)$$

Where p is the project/asset solely
Outstanding amount is the cash amount of the loan/investment

Calculation 2: Financed generation

$$Financed\ generation = \sum \left(\frac{Expected\ energy\ produced\ over\ lifetime_p}{Project\ lifetime\ (years)_p} \ x \ \frac{Outstanding\ cash\ amount\ of\ investment_p}{Initial\ Cost\ of\ Investment_p}\right)$$

Where p is the project/asset solely
Outstanding amount is the cash amount of the loan/investment
Actuals can be used if available, e.g. if for reporting

Disclosure principles

The climate solutions (listed equities and corporate fixed income) guidance released in November 2023, identified two disclosure principles – transparency and standardisation – for investors to protect the integrity of their approach to measuring exposure to climate solutions and setting objectives for scaling up investment in solutions. Investors using IIGCC's climate solutions guidance are recommended to continue to apply these principles alongside a new third principle which is identified below.

1. **Transparency:** Disclose assumptions and methodologies in a clear, fair and not misleading manner.
2. **Standardisation:** Use disclosure templates to enhance standardisation of climate solutions disclosures across the industry.
3. **Alignment with climate science:** Disclose the extent to which the objective has been aligned with a climate scenario[21].

18 See PCAF standard https://carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf
19 See PCAF standard, section 5.3 https://carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf
20 See https://www.lazard.com/research-insights/levelized-cost-of-energyplus/
21 The nature and granularity of disclosure on climate scenario alignment can be determined by each investor. Investors may wish to cover include which, if any, climate scenario/s or pathways have been used to inform decision making and the rationale behind that view (including any limitations or uncertainties in scenarios used).

Inclusion of climate science principle

Whilst many net zero signatories have set objectives to increase portfolio allocation to climate solutions over time, IIGCC's guidance does not offer recommendations on an allocation and/or threshold that investors need to achieve to be considered as having a Paris-aligned allocation to climate solutions. There are a few reasons for this, which include the fact that these trajectories cannot be easily translated into total allocations within discrete investment portfolios, uncertainty about future technology mix and commercial viability, and risk return profiles of different solutions making them less or more well suited to different investment strategies. However, in renewable energy generation, most climate scenarios identify notable high-level differences in needs by region and technology (e.g. wind, solar, etc.).

Considering regional imbalances in capital flows

Emerging Markets and Developing Economies (EMDEs) account for 86% of the global population, 60% of global GDP and approximately 75% of global carbon emissions[22]. Yet, they account for less than 15% of clean energy investment (excluding China). It is expected that they will require about USD1 trillion per year to 2030 in private finance to align with the Paris goals[23]. Failure to address the regional imbalances in clean energy investment represents a systemic financial risk to investors' portfolios, as net zero can only be reached at the global, not regional, level.

Investments in EMDEs are an opportunity. The IEA estimates that every dollar invested in clean energy in EMDEs (excluding China) will result in 12 tonnes of emission reductions in 2035, or 30% more than in advanced economies[24]. EMDE investments contribute towards broader sustainable development goals such as access to clean energy, clean cooking, resilience and job creation. For 'universal owners'[25], investing in local infrastructure or early-stage private equity in EMDEs can spur in-country GDP growth, which, in turn, can enhance the value of their global holdings.

The use of metrics such as impact metrics on energy access and employment could support investors to integrate these regional considerations. These will be scoped in a subsequent discussion paper.

Considering this, whilst this guidance does not recommend specific thresholds or allocations, it is suggested that climate scenarios and pathways should be used as an input to climate solutions objective-setting. In the context of this guidance, this means that when setting voluntary climate solutions objectives for renewable energy, investors should consider these variations in regional (e.g. developed, emerging and developing markets) and technology (e.g. solar, wind, etc.) needs. This includes pathways for different regions and types of energy technologies. This guidance does not recommend any specific pathway; investors are likely to use pathways that are appropriate in the context of their regional and sectoral portfolio composition. Investors are encouraged to disclose the extent to which their climate solutions objectives have been informed by climate science and any limitations to this (e.g. availability of scenarios or data).

22 Goldman Sachs (2024), Emerging Markets, Global Impact: Driving Sustainable Growth.

23 Independent High Level Expert Group on Climate Finance (2023), A climate finance framework: decisive action to deliver on the Paris Agreement. Required EM investment figures exclude China.

24 IEA (2023), Scaling up Private Finance for Clean Energy in EMDE

25 UNEP FI (2011) – Universal Ownership – why environmental externalities matter to institutional investors

Annex 1: Comparison of benefits and drawbacks of proposed metrics

To support investors in selecting 'additional' metrics to use in a dashboard approach (as recommended by this guidance), this annex outlines some of the high-level considerations that may be taken into account in selecting different metrics and their complementarity to each other.

	Potential benefits	Potential drawbacks
Financed installed capacity *The installed capacity[26] associated to the investment activities made by the financial institutions*	▪ Articulates both the contribution the entity is making to decarbonise the power system and to support the global tripling renewables goal ▪ Once attributed, this metric is aggregable as it relates to new capacity additions, which are only constructed once ▪ Relatively straightforward access to data *Additional benefits for secondary markets*: ▪ Recognises downstream ownership of renewable generation assets, allowing all investors to communicate contributions to decarbonising the power system ▪ Attributed ownership at the end of a reporting year can be aggregated by one investor ▪ Growth in secondary ownership of these assets should in theory be comparable with the 'tripling' goal	▪ Doesn't directly represent the ultimate impact on energy supply due to variations in capacity factor by technology and geography ▪ Due to the above, could in theory disproportionately incentivise capacity additions in certain technologies and locations, irrespective of regional / technology needs *Additional drawbacks for secondary markets*: ▪ Cannot be aggregated as can reflect multiple points of entry and exit for the same assets over time (inherent challenge for the secondary markets)
Weighted average capacity factor[27] *The weighted average capacity factor across the portfolio*	▪ Incentivises more efficient or higher performing renewable assets with greater decarbonisation potential	▪ Not directly comparable to the tripling renewables goal ▪ Capacity factor may not represent actual generation (e.g. due to curtailment) ▪ Lower data availability based on current reporting by companies and funds
Financed generation *The renewable energy generation[28] associated to the investment activities made by the financial institutions*	▪ Has the most direct link with climate impact ▪ Incentivises higher performing assets ▪ Captures impact of operational performance and establishes role for stewardship of assets	▪ Not directly comparable to the tripling renewables goal ▪ Not as widely reported and may be commercially sensitive

26 Installed capacity: The maximum amount of the electrical output that can be produced by a generating unit. U.S. Energy Information Administration (2024), Electricity explained

27 Installed capacity factor: The ratio of the electrical output produced by a generating unit for the period of time considered to the electrical output that could have been produced at continuous full power operation during the same period. U.S. Energy Information Administration (2024), Glossary

28 Energy generation: Production of electrical energy resources from sources of primary energy (e.g. solar). ScienceDirect (2024), Energy Generation

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