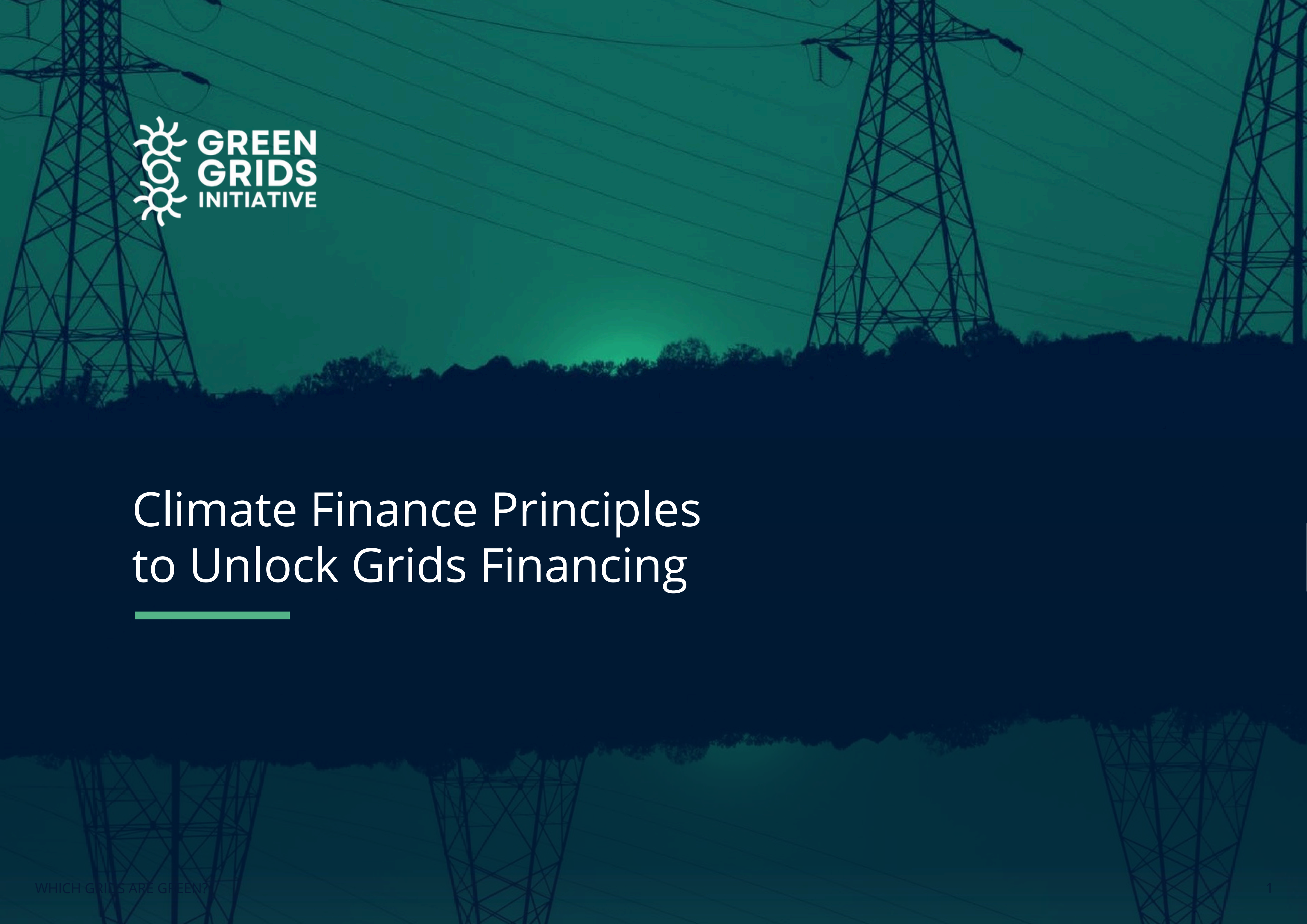
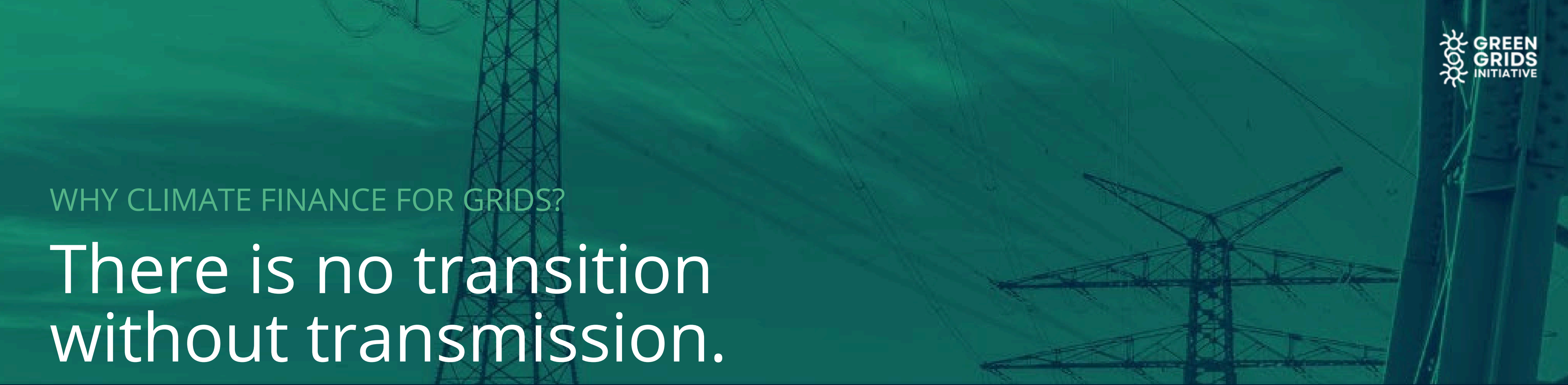


GREEN GRIDS INITIATIVE

Climate Finance Principles to Unlock Grids Financing

Table of Contents



WHY CLIMATE FINANCE FOR GRIDS?

There is no transition without transmission.

The upgrade and expansion of electricity grids is essential to delivering reliable electricity to drive growth and to integrating new, low-cost, low-carbon energy supplies. Grids also underpin key demand-side technologies, such as electric vehicles. Their enhancement leads to increased energy security and resilience[1], greater energy access globally, and reduced overall costs of the energy transition. Investment needs are high, and there is a financing gap.

Over the next 20 years, electricity demand will almost triple, requiring annual grid investment to double to over USD 700 billion per year by 2030[2], and then increase to over USD 1 trillion per year from 2035 onwards.

Climate and concessional finance can provide important additional sources of capital and derisking for grid investments; current climate finance rules exclude more than 60% of grid projects globally. In particular, current classification approaches do not fully recognise the catalytic role that grid investments can play in the decarbonisation of fossil-fuel-dominated regions and transitioning economies[3].

However, since grids transmit power from all connected generation sources deciding "which grids are green" is more complex than that of individual generation projects.

Different approaches to classification create ambiguities about grids' eligibility for climate and green finance, which makes co-financing more complex

" current climate finance rules exclude more than 60% of grids globally "

They also fail to integrate adaptation co-benefits to fully capture the value of grid investments in transitioning economies.

Co-developed by GGI with investors and industry representatives[4], these Principles aim to address these ambiguities and barriers by establishing a widely agreed, inclusive, forward-looking approach to assessing grids' eligibility for climate and green finance.

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[1] In this document, "adaptation and resilience" always refers to climate adaptation and resilience. This includes the resilience of both the energy infrastructure itself and the overall energy system, including contributing to resilience during and, recovery after disruptions, by climate events. Further in the document, "adaptation and resilience" always refers to climate adaptation and resilience.

[2] Source: IEA – *From Taking Stock to Taking Action, How to implement the COP28 energy goals (2024)* - accessible on: https://iea.blob.core.windows.net/assets/f2f6dbe0-ee3d-4ffc-ac8b-b811a868b9b1/FromTakingStocktoTakingAction.pdf

[3] As they classify grid investments on the basis of the emissions profile of generation technologies already connected to the grid, rather than assessing what will be connected as a result of the investment.

[4] See the final section of the document for a list of members of the GGI Finance Working Group.

Financing the transition means looking ahead not at what grids are, but at what they are becoming.

GRIDS OF THE FUTURE

Grids are central to decarbonising fossil-fuel power systems and safeguarding energy security amid climate extremes, so investors must focus on future additions to the system rather than current assets. At the same time, financiers need to be confident of the climate performance of investments over time; these Principles therefore place considerable emphasis on having in place transparent and robust plans and monitoring systems on which investors can base their assessments.

Using the Principles can transform the financing landscape from a fragmented one, where the projects most in need of concessional finance are excluded[5], to one where every Principles-compliant project can aggregate co-financing and access securitization from a broad spectrum of financial actors, both public and private. This level of multi-stakeholder coordination is essential for an effective transition.

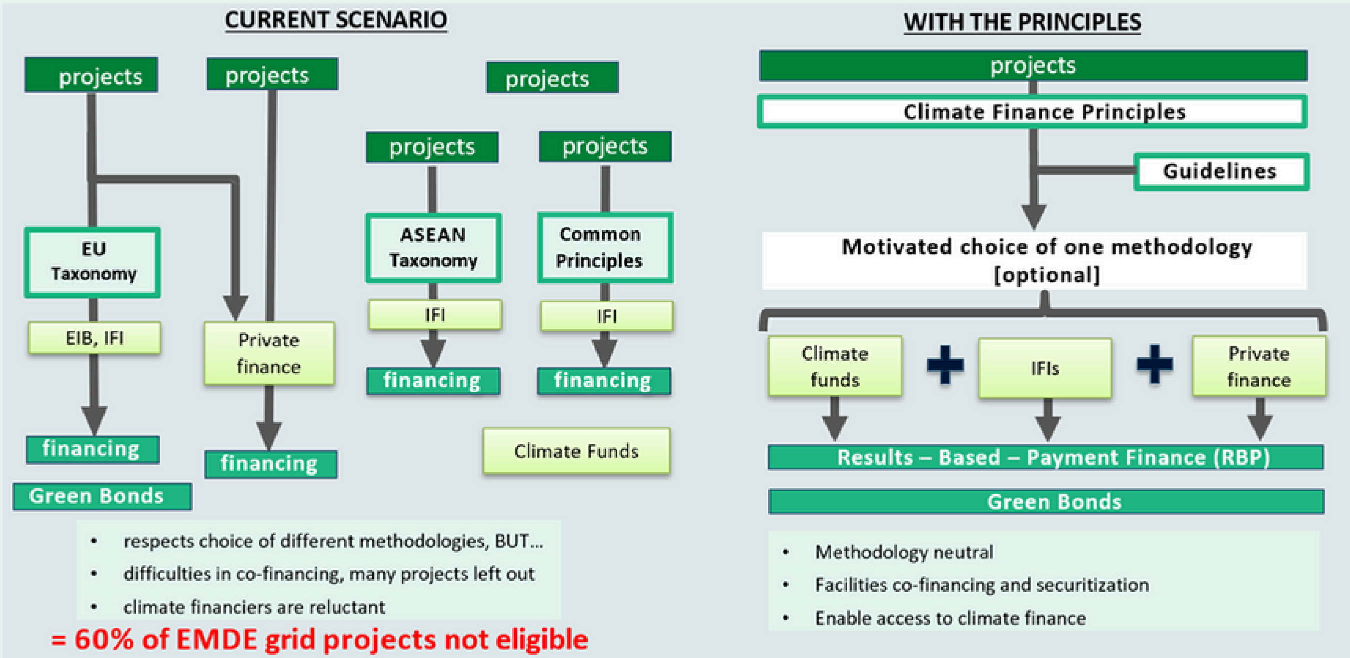


Figure 1. *Principles as "lingua franca" to unify a fragmented financing landscape*

[5] More than 60% of grids globally are out of scope of the EU Taxonomy. Investments needed for decarbonising EMDEs are particularly affected. It requires either that the current carbon intensity of the grid be below 100 gCO_2/kWh, or that at least 67% of generation capacity added in the past five years has had a carbon intensity below this threshold. Climate funds like the Green Climate Fund (GCF) do not currently specify a classification methodology for grid projects, and it is unclear how/if grid projects can qualify for climate finance.

Climate Finance Principles for Grids

These Principles set out a framework for assessing whether a grid project qualifies for climate or green finance. They do not set explicit targets or definitions, leaving flexibility for stakeholders such as accreditation agencies, investor groups, or IFIs to develop or agree on thresholds subsequently; these Principles are intended to set the framework for such processes. The Principles can be applied at two levels:

- **Principles 1-3 – the "system-level criteria" –** apply to utilities' green bonds and portfolios of investments, as well as other forms of green securitization. This sectoral approach enables application to projects of all sizes in meshed AC grids, including smaller-scale investments such as individual transformers or individual equipment, normally financed by second-tier financial institutions[6].
- **Principles 1-6 – are intended to be applied to the financing of individual projects** of various sizes. In addition to the system level criteria, criteria specific to the project also need to be met.

The Principles cover mitigation as well as adaptation and resilience. However, as a minimum, mitigation Principles 1–3 (the system-level criteria) must be satisfied in order for projects and sectoral activities to qualify for either climate mitigation or climate adaptation and resilience (or for both).[7]

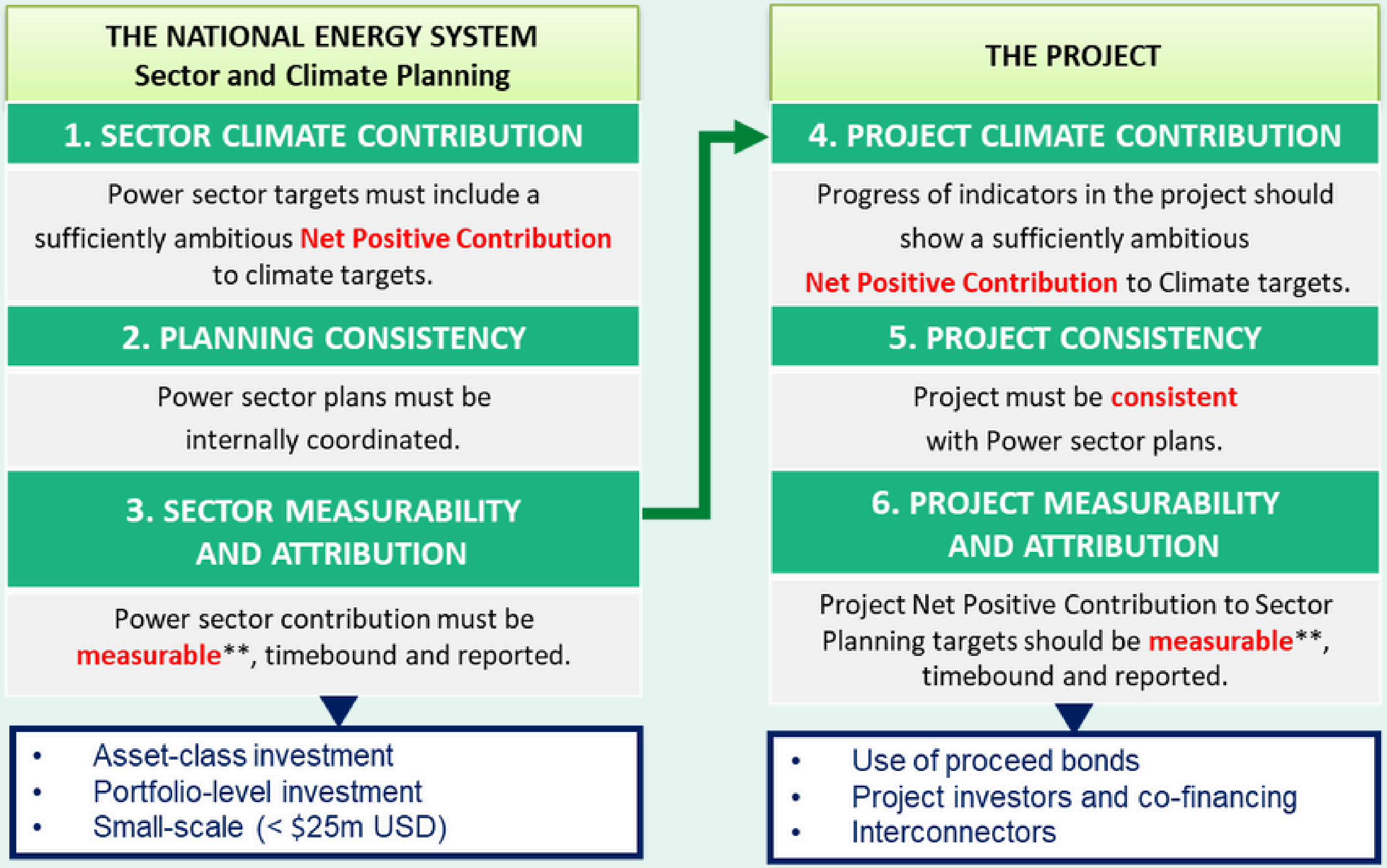


Figure 2. *Climate Finance Principles - logical flow for application*

Automatically Included and Excluded Investments

The assessment flow acknowledges that **some types of grid investment should automatically qualify** as eligible for climate and green finance without needing to go through an assessment.

These are:

1. Transmission lines that are dedicated exclusively to the transfer of low-carbon power to the main grid[8].
2. Storage that increases grids' flexibility and helps address renewables' variability.
3. Stabilization devices for frequency control and quick load adjustment, such as stabilization-dedicated batteries, flywheel storage, synchronous condensers, and devices enabling demand response.
4. Grids with current carbon intensity below 100 gCO_2/kWh, or where at least 67% of generation capacity added in the past five years is low carbon[9].

Some types of grid investment should automatically be excluded (e.g., radial lines to fossil fuel plants, or investments that result in significant loss of carbon sinks or biodiversity areas and that therefore pose high carbon lock-in and transition risks).

[6] For these smaller investments, fossil fuel radial lines or transformers mainly connecting fossil fuel radial lines should be automatically excluded.
[7] Defined as having an emission intensity <100 gCO_2/kWh.
[8] Defined as having an emission intensity <100 gCO_2/kWh.
[9] For example, a project can be fulfilling only adaptation objectives, but it would still not be eligible if the sector does not exhibit sufficiently ambitious mitigation commitments.

DESCRIPTION OF THE PRINCIPLES

1 Sector Climate Contribution

Power sector targets must include a sufficiently ambitious Net Positive Contribution to climate targets.

Climate indicators and targets outlined in power sector plans should show a sufficiently ambitious Net Positive Contribution to Climate Planning[10] targets. As a minimum, this should include contributions to mitigation targets and can optionally also include adaptation and resilience targets. Improving alignment of Power Sector Planning[11] with Climate Planning[12] strengthens signals to investors regarding the political commitment to the energy transition.

A Net Positive Contribution approach implicitly recognizes that different grids start from different energy mixes and baseline conditions and shouldn't be penalized for that. Assessing sufficiency of ambition for mitigation implies countries' power sector plans are expected to include a power system decarbonization ambition and/or targets for the phase-out of unabated fossil fuels that are aligned with recognized net-zero pathways over appropriate timelines[13].

Net Positive Contribution to mitigation may be identified in terms of a rate of reduction in the Grid Emission Factor (Δ% or $\Delta gCO_2/kWh$)[14], or alternatively a rate of increase in the share of low-carbon electricity generation (Δ% or ΔGWh).
Taking a rate-based approach acknowledges the situation of countries that start with a high emissions intensity, where the forward trajectory and stated endpoint is a more useful indicator of contribution to climate mitigation targets than absolute starting levels. To assess contribution sufficiency, alignment with benchmarks from established and recognized power sector decarbonization pathways should be measured[15].

Adaptation and resilience at the sector level may be assessed in addition to mitigation. Assessing sufficiency of ambition of grid planning should also consider National Adaptation and Resilience Plans (where formulated[16]), demonstrate physical risk assessments (including scenario analysis) or include quantitative adaptation goals at the systemic and at the community level[17].
Ensuring a Net Positive Contribution of the sector to climate plans also permits the inclusion of additional targets. For example, in the assessment against this Principle, stakeholders could choose to also consider energy access or the catalytic role of grids in decarbonising end uses and in electrifying demand[18].

Complementing the key decarbonization indicators with additional ones will, of course, depend on relevance and information availability.
Please refer to the following dedicated chapter for guidance on choosing indicators.

2 Planning Consistency

Power sector plans must be internally coordinated.

A forward-looking approach to assessing eligibility for climate finance requires that investors have confidence that grid investments will contribute to the achievement of global climate targets; in turn, this requires robust and well-integrated **power sector planning** carried out at a level of spatial detail that matches the investment being considered (e.g., sub-national, national, or regional). In cases where there is weak alignment across different planning documents, there is a risk that energy generation develops in the opposite direction of the climate targets.

Power Sector Planning identifies all documents outlining the development strategy for the power system at national and sub-national level. Different countries may have different Power Sector Planning instruments, such as Energy Transition Plans, Renewables Roadmaps, Power Development Plans, Transmission & Distribution Plans, Electric Transport Plans, etc. Internal coordination means that, where multiple such documents exist, they are based on robust evidence and that a clear relationship exists between them to enable transparent decision-making. Power Sector Plans will outline national or sub-national indicators and targets, and these need to be consistent and coordinated across the various instruments.

In particular, demand, generation, T&D, and interconnection planning should be well coordinated: this alignment is crucial, as it is the generation planning that will ultimately determine the carbon trajectory of the system.
The identified Power Sector Plans should also at least cover a timespan consistent with lending tenors. Typically, the planning horizon can legitimately be significantly longer than the standard 10 years, as it is more aligned with the lifecycle of the planning process.
For interconnectors, assessment of planning alignment should be done for all connected geographies.

[10] Climate Planning identifies all documents outlining the national or sub-national strategy to address climate change, such as Climate Change Roadmaps, Climate Strategies, National Plans on Mitigation, Adaptation, or Resilience, and Nationally Determined Contributions to the Paris Agreement. Climate Plans outline national or sub-national indicators and targets relative to energy and energy-related emissions.
[11] Power Sector Planning identifies all documents outlining the development strategy for the power system at national and sub-national level. Different countries may have different Power Sector Planning instruments, such as Energy Transition Plans, Renewables Roadmaps, Power Development Plans, Transmission & Distribution Plans, and Electric Transport Plans.
[12] Climate Planning identifies all documents outlining the national or sub-national strategy to address climate change, such as Climate Change Roadmaps, Climate Strategies, National Plans on Mitigation, Adaptation, or Resilience, and Nationally Determined Contributions to the Paris Agreement. Climate Plans outline national or sub-national indicators and targets relative to energy and energy-related emissions. Different countries may have different climate instruments and policies reflecting their goals on climate adaptation and mitigation for the energy sector. Other metrics, such as energy access, may be appropriate, for example in the case of least-developed countries.
[13] Other metrics, such as energy access, may be appropriate, for example in the case of least-developed countries.
[14] See section on Choosing Indicators. This captures the climate benefits of all low-carbon sources, including large hydro, nuclear power, and battery storage. However, decreases in the Grid Emission Factor achieved primarily by shifting from one unabated fossil fuel source to another (e.g., shifting from unabated coal to unabated gas) are unlikely to lead to sustainable long-term decarbonization pathways, making this indicator less appropriate in such cases.
[15] For example:

- The Science Based Targets Initiative (SBTi) Guidance for the Power Sector could provide a useful way to benchmark sector contribution to mitigation. For instance, decarbonization trajectories could at least match the slope of curves within the SDA Pathways for the Power Sector.
- The Transition Pathway Initiative (TPI) Sectoral Decarbonization Pathways also provide benchmarks (pp. 7–8) for the decarbonization of the electricity sector, with varying expectations across different regions, that could be taken as reference.

Pathways may be global, regional, or even national (the latter are set in some Long-Term Strategies that can be considered aligned with the goals of the Paris Agreement).
[16] Where such A&R plans have not already been set out at national level, power sector plans should include one or more of the following:

- Assessment and mitigation of physical climate risks within defined timelines and spatial boundaries
- Monitoring and verification processes, including fit-for-purpose A&R indicators
- Trade-offs with mitigation actions

[17] Useful indicators of A&R contribution could capture diversification of renewable sources, decrease in downtime during acute weather/land-mass events, reduction of losses under high temperatures, and increased redundancy of the system. Note also that the contribution of resilience could include the ability of the energy system to safeguard the most vulnerable beneficiaries within communities against extreme climate events.
[18] Electrified end devices like EVs, charging infrastructure, and heat pumps are far more energy-efficient than their fossil fuel combustion equivalents. Regardless of the electricity source, their deployment can result in a significant reduction in real-world emissions.

3 Sector Measurability and Attribution

Power sector contribution must be measurable, time-bound, and reported with reasonable frequency, at least annually.

Chosen sector indicators[19] should be relevant, material, strategically significant, and time-bound. In turn, this implies proponents must clearly identify data and collection mechanisms: the data should be accessible and updated regularly (at least annually), and the collection mechanisms should be robust. In addition, demand data, both current and projected, could be needed over time to validate outputs. Therefore, it is recommended that project proponents engage in early dialogue with national entities to obtain these data. Outlining the data needs and the collection mechanisms is essential.

Thereafter, analysis will need to **define the spatial boundaries of the relevant grid** in order to effectively scope the choice and analysis of key indicators and targets. Grid projects can vary widely, ranging from the addition of a few transformers to the implementation of international interconnectors, as the table shows.

Choice of spatial boundaries should ideally also reflect considerations related to adaptation and climate resilience (e.g., asset hazard exposure and vulnerability, criticality assessments, interdependencies, etc.). **For most situations, the system boundaries will be defined by the extent of the synchronously operated electricity network.**

TYPE OF PROJECT	SCOPE OF ANALYSIS
Dedicated lines and equipment to connect a particular plant to the grid	Scope of analysis should be the plant connected
Transmission or Distribution lines and equipment that reinforce a meshed national grid	Scope of analysis should be the entire national grid of the country
Transmission lines and equipment that connect (or reinforce the connection between) two isolated domestic sub-grids (e.g. archipelago)	Scope of analysis should be the combination of sub-grids' overall carbon footprint (overall net positive contribution) i.e. the system composed by the newly built/retrofitted physical infrastructure with all the new connections directly linked to it
Interconnectors or transmission lines that connect two or more different countries/systems	Scope of analysis should be the combination of both systems' overall carbon footprint (overall net positive contribution)

Some countries have several physically independent electricity networks, either because of their geography (e.g., archipelagos, such as Indonesia) or because of their infrastructural development (e.g. in China); even when sub-national electricity networks are physically connected, they might have different voltages, which makes them de facto independent[20].

Thirdly, **the choice of timescale for the analysis is important** and should be consistent with timescales considered for the Sector and Climate Planning, with a minimum of 10 years in the future[21].

For adaptation and resilience, selection of climate change models and scenarios is critical to properly identifying and assessing climate risk, and therefore to determining the appropriate measures to implement. Where a quantitative measurement of contribution is not possible (for example, because calculation tools or established methodologies are not yet available), a credible, evidence-based, and structured qualitative or narrative assessment could be proposed as an alternative.

[19] Choice of indicators is up to project proponents, in alignment with the investors who choose to utilize the Principles as an approach underpinning financial instruments being raised for the project(s).
[20] This means that, in some cases, sub-national indicators and targets should be considered in lieu of national ones.
[21] The timespan of 10 years has been identified on the basis that:
- Power sector planning often covers timespans of 15–30 years.
- Impacts of projects/portfolio interventions at sector level do not materialize immediately after projects are commissioned, but normally after 3–5 years.

4 Project Climate Contribution

Project progress should show a sufficiently ambitious Net Positive Contribution to climate targets.

The Net Positive Contribution approach is considerate of baseline conditions. Options for identifying whether mitigation contributions are "sufficiently ambitious" could include, for example:

- Mandating a minimum share of newly added capacity connected to the project being low-carbon within a certain timeframe after the Project Commissioning Date (COD)[22], or
- Mandating that the incremental climate benefits of the project (i.e., progress in the climate indicators enabled by the project) follow the expected rate of change of the relevant indicators at national level, as included in the Power Sector Plans and chosen sectoral decarbonization benchmarks.

Analyses of project impacts should take account of their contribution to 'paradigm shifts'[23] in the sector and their alignment with climate planning ambitions. It is also important in order to minimize the risks of maladaptation to climate change in the sector by fostering coherent planning that takes into account climate vulnerability scenarios and avoids investments that could exacerbate risks in the medium and long term.

At the project level, climate adaptation and resilience may be assessed either in addition to or as an alternative to mitigation, as long as the project satisfies Principle 4. In order to assess contribution sufficiency, regional benchmarks, National Adaptation Plans (if available), or global best practices could be taken as reference[24].

In this respect, some interventions located in areas with high vulnerability to climate change should automatically qualify as increasing climate resilience, such as substitution of overhead lines in areas exposed to windstorms and hurricanes with equivalent underground cables, or implementation of grid-level equipment (including transformers, inverters, substations) that increase grids' resilience[25] or flexibility so as to enable a higher share of low-carbon generation to be connected or reduce its downtime.

Interconnectors will have regional impacts across multiple countries that may have varying degrees of climate ambition. For interconnector projects, the system[26] cumulative emissions should be lower than would be the case without the interconnector within the interconnected grids and the timeframe of the project.

Additionally, interconnectors can also deliver climate resilience benefits to beneficiary communities by strengthening their adaptive capacity through project investments. This is particularly relevant for communities that face significant vulnerability to extreme climate events, such as heatwaves or droughts, which may lead to increased energy demand and potential service disruptions. Interconnector projects that directly enhance the resilience of these populations display a stronger Net Positive Climate Contribution.

5 Project Consistency

Projects must be consistent with power sector plans.

If specific grid projects are individually identified within the national sectoral planning documents, then these projects can automatically be considered to be consistent with national plans, provided they satisfy Principle 1. Where the project has not been identified within national power sector planning, it must demonstrate consideration and consistency with such plans.

This means that the **choice of project indicators** to be monitored should be **consistent with the identified indicators at the Sector Contribution stage**. In practice, the same key climate indicators (i.e., Grid Emission Factor, Share of Low-Carbon Electricity, relevant adaptation and resilience indicators) must be considered for both the Power Sector Planning and the project.

Again, beyond climate indicators, other relevant, material, and time-bound project performance indicators could also be included in the assessment, and the same consistency principle applies to them.

For interconnectors, the project alignment assessment should be performed for all the connected geographies.

[22] For example, if project COD is set to 2035, investors could mandate that, within the period 2035–2040 (i.e., five years from COD), at least 67% of new generation capacity additions in country X (or in sub-national region Y) is low-carbon. Alternatively, they could mandate the same but looking at the period 2040–2045 (i.e., from five to ten years post-COD).
[23] For example, the Green Climate Fund (GCF) defines this as the degree to which the proposed activity can catalyze impact beyond a one-off investment and result in medium- to long-term change.
[24] In this respect, the authors acknowledge that the international dialogue on adaptation and resilience is still ongoing; for this reason, the sentence is high level. Authors reserve the right to add further specifications in the future to reflect the international consensus on specific indicators, once that is achieved.
[25] For example, digital systems to decrease downtimes in substations or management centres, and equipment to increase the self-healing and re-routing capacity of grids.
[26] Intended as the system identified within the chosen spatial boundaries and timeframes.

6 Project Measurability and Attribution

Project Net Positive Contribution to Sector Planning targets should be measurable, time-bound, and reported with reasonable frequency (ideally annually).

For decarbonisation, simulation and computation could be used to ex-ante[27] assess the expected changes in the Grid Emission Factor over time, as well as to assess the outlook for other key indicators such as variations in the share of low-carbon electricity[28] and—if included—the electrified demand connected over time. For the monitoring ex-post (i.e., post-commissioning date), real yearly data must be utilized instead. The existing computation methodologies and grid simulation software also allow identification and tracking of the contribution of an individual project to the overall grid's decarbonisation indicators over time, as the example in the Annex shows. Simulation and computation tools should preferably be open source and established.

For chosen adaptation and resilience indicators, formulas and/or methodologies adopted to measure progress by effect of the project should also be outlined. Where a quantitative measurement of Net Positive Contribution is not possible (for example, because calculation tools or established methodologies are not yet available), a qualitative assessment could be proposed as a short-term alternative.

Spatial boundaries and timespan considered for the project performance measurements (whether with or without simulation) should be consistent with those identified within the Sector Contribution assessment. In particular, the timespan for the assessment should be at least five years after the Commissioning Date (COD)[29].

This Principle remains the same for interconnectors, even if the simulation and computation might be slightly more complex: for interconnectors, measurable and verifiable data on project indicators' progress should ideally be provided for each of the connected geographies and for the overall system formed by the interconnection.

Assessment of project Net Positive Contribution across the chosen indicators should be undertaken and reported periodically (ideally annually). Performance measurement should account for sector and climate planning evolution, relevant regulatory changes, and benchmark against the most updated version of the planning.

[27] Or to perform the assessment again in case of regulatory or planning variations over time.
[28] Low-carbon capacity (GW) or capacity share (%) can be utilized as a proxy in the absence of electricity (MWh) data baselines or projections. On choosing indicators, please see the following dedicated chapter, "Choosing Indicators."
[29] The timespan of five years has been identified on the basis that impacts of projects/portfolio interventions at the sector level do not materialize immediately after projects are commissioned, but normally after 3–5 years.

Application of the Principles

THE PRINCIPLES CAN SERVE A WIDE RANGE OF GRID INVESTMENTs AND INVESTORs TYPE

For private finance, the Principles set out an approach for the following types of investment:

- **Project-level investments** – individual projects, ranging from relatively simple dedicated lines connecting a plant to the grid, through to more complex transmission lines that reinforce the meshed national grid, to billion-worth interconnectors between two different countries.
- **Sector-level investments** – financing portfolios of grid-related investments, for example, investments planned by a larger corporate or utility within the same country, or portfolios of small-scale grid interventions financeable by a commercial bank. This can include corporate green bonds.
- **Non-corporate green bonds** – Principles can also help climate funds, which do not currently have an agreed methodology for assessing the eligibility of climate finance for grid projects, to streamline their decision-making by advising applicants to make use of these Principles when developing project proposals.

MDBs and bilateral agencies generally apply Common Principles[30] that allocate a portion of any given investment to their overall climate finance portfolio, based on the indicators agreed at the institutional level. Being methodology-neutral[31], the Principles are not intended to change this approach but could provide MDBs and bilateral agencies with a more streamlined way to set up blended finance.

For example, Principles could be utilized within grid-dedicated fund structures pooling capital from institutional, public, private, and philanthropic stakeholders that normally abide by different green qualification approaches, especially as these funds normally focus on multiple countries within a region, each of which also has a national taxonomy. These stakeholders can adopt the Principles as a commonly agreed basis for assessing projects' eligibility, in order to streamline and harmonize climate finance eligibility assessment, but also to link Payment-by-Results Financing (PBR) to projects' measured Net Positive Contribution over time.

Beyond funds, blended finance and private sector participation in EMDE grid infrastructure are also key for interconnectors and access-increasing grid expansions, so financiers could adopt the same approach to facilitate co-financing of large-sized, strategic T&D endeavours.

THIRD-PARTY VALIDATION

Taxonomies, Sustainability-Linked Loan Principles, and other constructs make extensive use of third-party verifications in order to validate stakeholders' assessments, and a number of certified practitioners are available to provide independent opinions.

The same assurance mechanisms could be utilized for the Principles. In particular, stakeholders could mandate a third-party assessment to verify any or all of the following:

- Power sector planning consistency (Principle 1) and project consistency (Principle 4)
- Net Positive Contribution to climate planning targets
- Data and collection mechanisms soundness
- Overall assessment for a project or a portfolio
- Periodic performance reporting

[30] https://documents.worldbank.org/en/publication/documents-reports/documentdetail/514141645722484314/common-principles-for-climate-mitigation-finance-tracking

[31] The Principles do not contradict or seek to replace any existing climate qualification methodologies; rather, they offer a wider overarching framework as a basis for dialogue. By bringing stakeholders together, the Principles will ensure that each financial actor can operate with its own specific de-risking capacity and products.

Choosing indicators

Choice of indicators will depend on sector alignment and data availability.

For **key mitigation indicators** (which should be mandatory at the sector level), there is a choice between:

- Rate of decrease in the **Grid Emission Factor (measured as a change in gCO_2/kWh or as a percentage change)** over time by effect of a shift to low-carbon or fully abated fossil fuel technologies[32], or

- Rate of increase in the **share of low-carbon electricity generation (measured as a percentage change)**[33]. Electricity shares or volumes[34] (%, MWh) are preferable to **capacity shares or volumes (%, MW)**, as intermittent renewables often have low capacity factors; however, the latter can still be used as a proxy in case no other data is available.

Besides key mitigation indicators, additional indicators could be monitored. Here is a non-exhaustive list:

Climate Adaptation and Resilience (structural and functional)

- Increase in non-hydropower RE (Δ%) restoration time after acute "land-mass" events (days)
- Annual probability of loss-of-power events (events/year)
- Number of customers impacted by loss of power per year
- Losses during periods of temperature > design temperature (%)
- Indicators of system reliability (%)
- Indicators of system redundancy

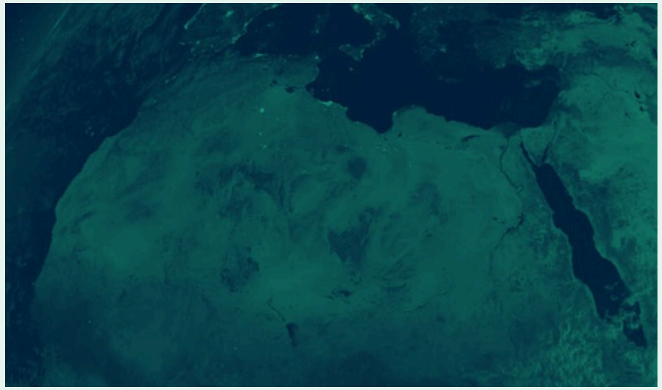
Security and Access

- Percentage of additional grid connections after commissioning (%)
- Increase in access (from baseline) (%)
- Number of customers with new consumer energy resources.
- Electrification of demand within the identified spatial boundary (%)
- Km of cables installed
- Increase in number of EVs (%) or charging station capacity
- Inertia indicators

Efficiency and flexibility

- % losses (technical)
- % of connections with smart metering
- Capacity of BESS installed
- Other flexibility indicators
- Additional transformer capacity (MVA)
- Transmission and distribution line losses (MWh or MWh/km)
- Cost to consumers of MWh transported (£/MWh)
- Annual energy savings (MWh/GWh for electricity and GJ/TJ for other energy savings)
- Required energy reserves (%)
- Outage frequency or restoration time(s)

Besides relevance, materiality, and measurability, the choice of indicators should also account for the possibility of aggregating indicators/values when considering investments at the portfolio level.



[32] This captures the climate benefits of all low-carbon sources, including large hydro, nuclear power, and battery storage. However, decreases in the Grid Emission Factor achieved primarily by shifting from one unabated fossil fuel source to another (e.g., shifting from unabated coal to unabated gas) are unlikely to lead to sustainable long-term decarbonisation pathways, making this indicator less appropriate in such cases.

[33] Volume of low-carbon electricity generation (GWh) can be used as a proxy in the absence of share (%) data; however, it is preferable to utilize share data, as higher electrification means the volume might increase anyway as a response to increasing demand but without necessarily implying increased decarbonisation.

[34] Volume of low-carbon electricity generation (GWh) can be used as a proxy in the absence of share (%) data; however, it is preferable to utilize share data, as higher electrification means the volume might increase anyway as a response to increasing demand but without necessarily implying increased decarbonization.

PARTNERS AND ENDORSEMENT

These principles were co-developed by the GGI Finance Working Group led by Co-Chair Lucia Fuselli, CEO Climate Strategies Consulting[35]

GGI would like to thank the following institutions for their important contributions to this work and for their continued membership of the GGI Finance Working Group:

- African Development Bank (AfDB)
- Agence Française de Développement (AFD)
- Asian Development Bank (ADB)
- Asian Investors Group on Climate Change (AIGCC)
- British International Investment (BII)
- Climate Bonds Initiative
- European Bank for Reconstruction and Development (EBRD)
- European Investment Bank (EIB)
- Glasgow Financial Alliance for Net Zero (GFANZ)
- Global Renewables Alliance (GRA)
- Global Wind Energy Council (GWEC)
- Gridworks
- HSBC
- Imperial College
- Institutional Investors Group on Climate Change (IIGCC)
- Inter-American Development Bank (IDB)
- International Renewable Energy Agency (IRENA)
- Swedish International Development Cooperation Agency (Sida)
- The Carbon Trust
- UK Department for Energy Security and Net Zero (DESNZ)
- UK Foreign, Commonwealth & Development Office (FCDO)
- Utilities for Net Zero Alliance (UNEZA)
- World Bank

A list of partners who have formally endorsed the principles is available at https://greengridsinitiative.net/climate-finance-principles/

[35] www.climate-strategies.com