Green Grids Initiative (GGI) Working Paper

MOBILISING FINANCE FOR GRIDS: TAKING STOCK OF CURRENT CLIMATE FINANCING APPROACHES

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Summary

This paper is a follow-up to the *Climate Finance for Grid Investments in Emerging and Developing Economies* paper published in October 2021, in collaboration with the Green Grids Initiative (GGI) Finance Working Group (WG). The 2021 paper detailed how climate finance is pivotal to meeting large investment requirements in grid infrastructure across emerging and developing economies (EMDEs). It also highlighted that current investment in grid infrastructure needs to increase from current levels of $70 to $300 billion by the end of this decade. This is critical for enabling the supply of low carbon electricity to meet growing energy needs whilst reducing greenhouse gas (GHG) emissions.

Climate finance can play a key role in accelerating the energy transition by identifying those grid projects that enable GHG emission reductions, thereby making them more investable, and by providing concessional finance to ensure an investment is more economically viable. The challenge for International Financing Institutions (IFIs), including those focused on development finance, and other funders is to identify which types of grid infrastructure investments should be counted as eligible for climate finance.

In the 2021 paper, we estimated that approaches on climate financing by IFIs, used to ensure grid projects enabled GHG emission reductions, may be too restrictive to scale investment to the levels required. We found that the key approaches for designating grid projects as climate finance, namely the Common Principles and EU Taxonomy, could limit coverage of projects that might qualify. This risks hampering efforts to mobilise the large-scale financing needed in EMDEs and steering investment away from countries who most need it to build out energy supply infrastructure whilst decarbonising. We also highlighted that climate funds do not have approaches in place to estimate climate benefits from grid projects, which could slow the availability of concessional finance.

This follow-up paper revisits the question of whether current approaches on climate finance eligibility are fit-for-purpose, after more than two years of implementation experience. It focuses on the perspectives of the finance community on current approaches, including benefits, challenges, and potential changes to increase climate financing. Discussion around changes to criteria is very much live across International Finance Institutions (IFIs) and climate funds. The proposals emerging from this paper are put forward as ideas to feed into ongoing discussions. They do not constitute definitive proposals by WG members but are from the authors of this paper, reflecting a range of discussions.

Firstly, there is a need for climate funds to develop approaches that help identify grid projects that are eligible for finance. This would help increase the availability of concessional finance, thereby improving the economic viability of grid projects particularly in EMDEs. With an important focus the need to identify emission reductions from such projects, a key element of the approach would be modelling-based to enable estimation, with potential monitoring afterwards to ensure outcomes as projected.

Secondly, for organisations using the EU Taxonomy (such as the Climate Bonds Initiative (CBI)), consideration should be given to forward-looking criteria based on planned investments, not just historical progress. This would help investments in countries where the grid was still carbon intensive but in which there was significant planned low carbon capacity. If considered, this would have to be balanced against the need to guarantee emission reductions associated with the project. Finally, under the Common Principles, consideration should be given to amending the criteria, moving from only considering the final share of very low carbon (VLC) at the end of the planning period to also weighting in the proportion of very low carbon (VLC) generation capacity additions over the same period. This would provide more recognition to how the system was changing based on new renewable investments.

1. Introduction

Grids are a crucial part of the energy infrastructure needed to meet existing and future electricity demands. The pace at which low carbon electricity generation can be scaled to meet growth in demand, and contribute to net-zero emission targets, will be heavily dependent on the availability of large-scale grid infrastructure.[1] This is particularly the case for Emerging Markets and Developing Economies (EMDEs). These regions account for the largest share of current energy demand growth, accounting for approximately 60% of total growth in 2019.[2] Out to 2030, EMDEs are projected to see average annual electricity demand per capita growth rates of 2.2%, based on the International Energy Agency's (IEA) Stated Policies Scenario.[3]

New grid investment at scale is crucial to enable this, as well as investment to upgrade infrastructure that is increasingly having to cope with harsher climates and extreme weather events.[4] However, there are a range of barriers to driving increased investment in EMDEs, including low investor confidence in project economics, perceptions of high investment risks of a country, regulatory uncertainty, power sector indebtedness, limited domestic budgets, and modest levels of private sector investment. These barriers have led to the decline in investment in transmission and distribution in EMDEs from 2015 to present day (Figure 1), further compounded by the COVID-19 pandemic.[5] In contrast, there has been an acceleration of renewable energy generation in EMDEs,[6] raising concerns that investment in grid infrastructure is not keeping pace with this growth.

Currently, energy investments within EMDEs are highly reliant on government sources of finance. State-owned utility companies are often dependent on tariffs and government appropriations to finance capital investment, as well as the operation and maintenance (O&M) of electric grids.[7] However, these sources will be insufficient for meeting the required future grid investments, with the needs for investment outpacing the sector's ability to finance and build new projects. The IEA states that while most of the projected investment will continue to be public, and sourced from state-owned enterprises, an increasing share will need to come from the private sector and International Finance Institutions (IFIs).[8]

As such, to encourage long term investor confidence and leverage existing public sector investments for grid infrastructure, the use of blended capital from development finance institutions, which may include concessional finance from climate funds, is pivotal in de-risking grid infrastructure and stimulating further investment within the sector. While climate funds provide a relatively small proportion of finance flowing into mitigation projects,[9] they can play a crucial role in catalysing investment through risk mitigation. This includes finance

[1] Brown, G., Chan, B., Clone, R. and Cutler., Z. (2022). Upgrade the grid: Speed is of the essence in the energy transition. Mckinsey and Company. Toronto.
[2] IEA (2021). Financing Clean Energy Transitions in Emerging and Developing Economies. International Energy Agency, Paris. June 2021.
[3] IEA (2022b). World Energy Outlook 2022. International Energy Agency. Paris. October 2022.
[4] D'Aprile, P., Geissmann, T., López, F.P., González., J.R. and Tai., H. (2021). How to increase grid resilience through targeted investments. McKinsey & Company. December 2021.
[5] IEA (2022a). World Energy Investment 2022. International Energy Agency. June 2022.
[6] Ibid.
[7] USAID (2022). Strengthening Utilities and Promoting Energy Reform (SUPER): Climate Finance for Electric Utility Investment. March 2022.
[8] IEA (2021). Financing Clean Energy Transitions in Emerging and Developing Economies. International Energy Agency, Paris. June 2021.
[9] Climate Policy Initiative (2022). Global Landscape of Climate Policy 2021. https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/

from the private sector, which the IEA identifies will be increasingly important to scale up investment in the sector.[10]

In parallel, investors and IFIs are increasingly looking to provide financing that is focused on clean energy projects and that, from an institutional perspective, can be counted as 'climate finance'. The challenge for grid projects is that they do not directly reduce emissions, but rather enable the supply of low carbon electricity from generators to consumers. They are therefore pivotal in the low carbon transition – but identifying which grid project investments can be designated as climate finance is not straightforward.

As highlighted in the previous Green Grids Initiative (GGI) working group paper,[11] this has led to an increased focus in recent years on how new grid project investments can be counted as climate finance. This has given rise to two main approaches used by the finance community: i) the EU Taxonomy,[12] developed by the European Commission, and ii) the Common Principles for Climate Mitigation Finance Tracking developed by the Joint Climate Finance Tracking Group of Multilateral Development Banks (MDBs)[13] and a group of representatives of the International Development Finance Club (IDFC) member banks.[14]

While crucial to ensure that finance is going to grid projects that are enabling a clean power sector transition, there are concerns that the approaches used may risk constraining financial institutions from selecting vital grid investment in EMDEs, either because of criteria that screen projects out due to high carbon intensity of existing generation (EU Taxonomy) or suggest low levels of climate finance attribution based on future shares of low carbon electricity dispatched (Common Principles). These risk slowing down the pace of grid investments in EMDEs. There is also the concern that other key climate funds, such as the Green Climate Fund (GCF), do not yet have approaches in place to determine climate compatible investments in order to release concessional finance to support investment in this sector (although GCF is currently working on guidance).

In this paper, we take stock of the experiences of different IFIs and other key stakeholders in implementing such approaches. Given the limited time these approaches have been in use, it is useful to reflect on experiences to date. We have elicited the experiences of a cross section of IFIs and other key finance stakeholders through a survey, with a view to learning from experiences to date. This overview of practice also provides useful information to stakeholders interested in financing approaches, and the different pathways for climate compatible grid financing. Based on the survey and subsequent discussions with the GGI Working Group (WG) on Finance, we highlight a number of issues that could inform discussions about amending aspects of the current approaches.

This report is structured as follows. We first set out the need to scale up grid investment to meet existing and future broader climate commitments, as well as discuss the current challenges faced by the investor community. In Section 3, we then detail the existing

[10] IEA (2021). Financing Clean Energy Transitions in Emerging and Developing Economies. International Energy Agency, Paris. June 2021.
[11] Pye, S., Shivakumar, A., and Price, J. (2021). Climate finance for grid investments in emerging and developing economies. Climate Compatible Growth Programme, November 2021.
[12] EU Technical Expert Group on Sustainable Finance (2020). Taxonomy: Final report of the Technical Expert Group on Sustainable Finance. March 2020.
[13] The MDBs involved are the African Development Bank; Asian Development Bank; Asian Infrastructure Investment Bank; European Bank for Reconstruction and Development; European Investment Bank; Inter-American Development Bank Group; Islamic Development Bank; New Development Bank; the International Bank for Reconstruction and Development; International Development Association; International Finance Corporation; and Multilateral Investment Guarantee Agency of the World Bank Group.
[14] MDBs and IDFC (2021). Common Principles for Climate Mitigation Finance Tracking. MDBs and International Development Finance Club. October 2021.

approaches to determining climate compatible grid investment projects, and we provide reflection on their use. Finally, Section 4 sets out proposed ways to amend approaches to help enable more grid investments in EMDEs.

2. The challenges for scale-up of grid investment

The energy transition towards a low carbon pathway is highly dependent on the scale and pace of grid investments. Bloomberg New Energy Finance (BNEF) estimates that grid investments globally need to increase by 3.4% annually to accommodate new renewable energy technology capacity, equating to roughly an extra $401 billion per annum by 2050 (relative to 2020), or $14 trillion cumulatively.[15] The increase in required investment is huge.

However, in recent years, there has been a preference from investors to focus more on financing generation projects rather than grid investments. This is especially the case for EMDEs, where there has been a gradual decline in annual grid investments, reflected in **Figure 1**, which have reduced by approximately 40% since 2015, while investments in renewable power generation increased by 30% over the same period. In contrast, advanced economies have seen grid investments increase by 14% between 2015 to 2022.

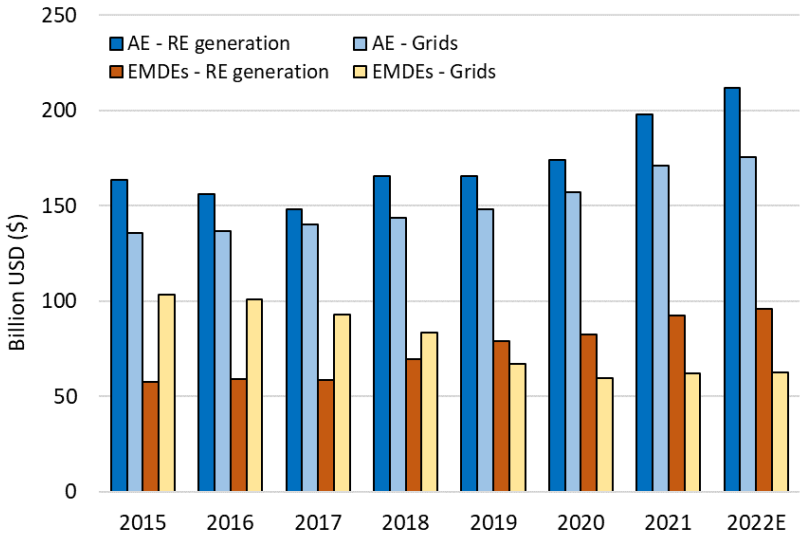

Figure 1. Average annual investment in the power sector by geography and category, 2011–2022. Source: adapted from IEA.[16] *Note that 2022 is an estimated value, AE is 'Advanced Economies', and RE is 'Renewable Energy'*

These trends illustrate the challenges for investment in electricity grids in EMDE countries, where financing grid projects can be difficult. This has resulted in a large share of investments being sourced from government sources, with many utility companies under predominantly public ownership via state owned enterprises (SOEs).[17] This has put growing pressure on government budgets, which account for 80% of total EMDE grid investment, and many near term projects stalling due to lack of funds.[18]

[15] Hale, Z (2021). World needs $14 trillion in grid spending by 2050 to support renewables. S&P Global Market Intelligence. February 2021.
[16] IEA (2022a). World Energy Investment 2022. International Energy Agency. June 2022.
[17] USAID (2022). Climate Finance for Electric Utility Investment – White Paper. Strengthening Utilities and Promoting Energy Reform (SUPER) Programme.
[18] Gridworks Partners (2022). Gridworks Perspectives: How to Boost Private Investment in Transmission. June 2022.

There are a range of challenges that investors face in deploying capital to finance grid investments, including the following:

*Lack of solid creditworthiness from utilities***.** Historically, utilities located in EMDEs have often been viewed as high-risk borrowers and have low credit ratings. Consequently, it has meant that debt and equity investments in EMDE countries are more costly compared to advanced economies, with capital investments up to seven times more expensive in EMDEs.[19] As such, this can act as a deterrent in encouraging further investment from the private sector.[20]

The need for patient capital. The approval process to obtain finance can be a time intensive process for utility companies, with the Rocky Mountain Institute's Climate Finance Access Network (CFAN) suggesting that approval process from major funds could take up to four years with utility companies challenged in preparing and packaging grid projects into financially viable assets.[21] This may result in utility companies often being discouraged to seek finance from climate funds that takes time to secure and instead seek urgent forms of capital.

Global supply chains disruptions. Severe supply shortages in recent years have delayed the supply of key raw critical materials needed for grid infrastructure, such as semi-conductors. These delays can cause inflationary pressure and lead to overall increases in component costs, thereby impacting economic feasibility of projects.[22]

*Pipeline projects have extensive lead times. C*onstruction of electricity grids are capital intensive and require extensive lead times from the initial investment decision to commissioning. Coupled with the growing shortage of technical personnel, this is likely to result in further delaying project lead times.[23]

Availability of sufficient data. Investors have stressed lack of information and data, for instance data on anticipated project performance. This can act as an additional barrier in mobilising further private investment.[24]

Political decisions around end-user tariffs and private ownership / operation of assets. Grid investments, like other infrastructure investments, may be subject to political sensitivities related to foreign direct investments within publicly owned infrastructure. Investments in less mature markets have a higher associated regulatory and country risk, due to the possibility of country specific factors eroding the profitability of conducting business.[25]

Climate finance, which both includes investment assessed by International Finance Institutions (IFIs) as being that used for 'climate friendly' projects, or dedicated finance from climate funds used exclusively for investment on mitigation and adaptation projects, is important for investment in grid projects. It has the potential to accelerate the energy transition by helping identify grid projects that enable greenhouse gas (GHG) emission

[19] IEA (2021b). World Energy Outlook 2021. International Energy Agency. Paris. October 2021.
[20] USAID (2022). Climate Finance for Electric Utility Investment – White Paper. Strengthening Utilities and Promoting Energy Reform (SUPER) Programme.
[21] Ibid.
[22] Brown, G., Chan, B., Clone, R. and Cutler., Z. (2022). Upgrade the grid: Speed is of the essence in the energy transition. Mckinsey and Company. Toronto.
[23] Ibid.
[24] USAID (2022). Strengthening Utilities and Promoting Energy Reform (SUPER): Climate Finance for Electric Utility Investment. March 2022.
[25] Norges Bank Investment Management. (2015). Infrastructure Investments in Less Mature Markets: Discussion Note. May 2015.

reductions, thereby making them more investable, and by providing concessional financing to ensure an investment is more economically attractive.

This is why the approaches adopted by IFIs to attribute investments as climate finance are important, providing sustainable investment opportunities in this key energy infrastructure. And why approaches adopted by climate funds are also key for the provision of concessional finance.

However, there remains a concern that current approaches may constrain the role that climate finance can play in helping scale investment in grid projects in EMDEs – and add an additional barrier to financing grids. The preceding CCG-GGI paper, published in 2021,[26] found that the key approaches for designating grid projects as climate finance, namely the Common Principles and EU Taxonomy, could limit coverage of projects that qualify. This more limited coverage could mean that grid projects in the region could lose out on the opportunities for investment, where climate finance considerations are key to the project moving forward. This is particularly the case for grids that are currently dependent on fossil fuels and are only just embarking on the low carbon transition. There is also a concern that the absence of approaches for climate funds could also lead to a deficit in available concessional finance, to support those projects being taken forward by IFIs.

The finance community needs approaches for grid project investment that can both safeguard the credibility of what is designated climate finance while ensuring that EMDEs, in particular, can gain much needed access to finance. In the next section of this paper, we elicit the perspectives of different organisations involved in the financing of grid projects to take stock of their experiences in the use of current approaches and possible changes.

3. Approaches to determining climate compatible projects

Across IFIs, there are a range of approaches in play in respect of how grid projects are identified and taken forward for financing, including on eligibility for climate finance. These differences reflect the different modes of financing, from those providing concessionary financing from dedicated climate funds (for example, GCF), to loans from MDBs, and to organisations providing accreditation for the issuing of climate bonds (for example, the Climate Bonds Initiative (CBI)).[27] Different organisations will adopt a specific approach based on the model and purpose of financing.

There are two main approaches in play that set criteria on whether a project investment can be designated as climate finance. The EU Taxonomy sets a threshold known as technical screening criteria that helps guide what investments can be considered climate finance or not.[28] The Common Principles, developed by the Joint Climate Finance Tracking Group of Multilateral Development Banks (MDBs) and a group of representatives of the International Development Finance Club (IDFC) member banks, are a set of definitions and guidelines

[26] Pye, S., Shivakumar, A., and Price, J. (2021). Climate finance for grid investments in emerging and developing economies. Climate Compatible Growth Programme, November 2021.
[27] The Climate Bonds Initiative (https://www.climatebonds.net/) administer the Climate Bonds Standard and Certification Scheme, which is a labelling scheme used by bond issuers to help prioritise investments that contribute to addressing climate change.
[28] EU Technical Expert Group on Sustainable Finance (2020). Taxonomy: Final report of the Technical Expert Group on Sustainable Finance. March 2020.

and a list of eligible activities that allow for consistent accounting and reporting of financial flows identified as climate change mitigation finance.[29]

The EU Taxonomy, adopted by the CBI,[30] uses criteria to identify whether a project is either eligible or not eligible. The first criterion focuses initially on the current intensity of the grid, which needs to be lower than 100 gCO_2/KWh for projects to be eligible. If not below this threshold, a second eligibility criterion is considered, to check whether at least 67% of new capacity additions on the grid (in the last 5 years) are below this threshold. The use of carbon intensity metrics for the existing grid, as opposed to projections of future carbon intensity, reflects the need for projects to be verifiable.

The Common Principles approach uses a forward-looking approach. For new greenfield investments to be eligible, the grid system must be projected to be reducing its carbon intensity by the end of a planning period of up to 10 years. The percentage attribution of the project investment as climate finance is based on the projected share of low carbon generation on the system at the end of the planning period. This is assessed based on a power system plan, or if unavailable, a decarbonisation plan. Given that this approach does not focus on binary eligibility criteria but rather percentage attribution, MDBs and IDFC members will take into account the share of investment identified as climate finance, together with the country context and a range of other factors, in deciding whether to support the investment. Brownfield project investments are generally eligible to be counted as climate finance where they 'demonstrate a substantial improvement in energy efficiency or a substantial reduction in net GHG emissions',[31] for example through reducing transmission and distribution (T&D) losses via infrastructure upgrades.

A cross-comparison of the above approaches is provided in Appendix 1. Based on the survey undertaken (see Appendix 2 for questions), the section that follows summarises the perspectives from a range of IFIs on the climate finance approaches used. This has been supplemented by further discussions of earlier drafts of this report. Responses are categorised across four categories – benefits, challenges, potential changes, and the role of modelling.

Benefits of climate finance approaches

A key stated benefit of the approaches used is that they allow for grid project investments to be classified as climate finance, which would not be the case in the absence of such approaches. This is because grid projects are an enabler of system decarbonisation, not direct contributors to emission reductions, and therefore it is challenging to designate investments as climate finance without clear criteria. There are some indications from working group members that this has had a positive effect on levels of investment in grid projects.

A further benefit of the approaches is that, in general, they provide clarity on what projects are eligible. For example, the Common Principles criteria are based on a clear requirement for increasing shares of low carbon generation in the coming years, demonstrated in credible national plans (power master plans or decarbonisation plans). For the EU Taxonomy approach, used by the CBI, again the approach can be argued to be based on clear criteria, and crucially for bond certification, verifiable based on observed capacity additions on the

[29] MDBs and IDFC (2021). Common Principles for Climate Mitigation Finance Tracking. MDBs and International Development Finance Club.
[30] CBI (2022). The Electrical Grids and Storage Eligibility Criteria of the Climate Bonds Standard & Certification Scheme. March 2022. https://www.climatebonds.net/files/files/Grids%20Criteria_March%202022.pdf
[31] MDBs and IDFC (2021). Common Principles for Climate Mitigation Finance Tracking. MDBs and International Development Finance Club, p. 14.

system. In addition, under this approach once a grid is deemed eligible almost any investment within it is eligible, resulting in low verification costs and strong inclusivity across potential projects.

Finally, the general consistency of approaches across organisations, notably for MDBs in the use of Common Principles, ensures a common understanding of requirements across those countries and organisations seeking financing for grid projects.

Challenges of implementing approaches

There is a recognition that the current approaches do favour those countries with lower carbon intensity grids or those with higher current and prospective shares of low carbon generation. There is therefore a risk that EMDE countries that have higher carbon intensity systems but who need investment in grid infrastructure do not receive financing (under EU Taxonomy), or because the percentage attribution (derived under Common Principles) does not demonstrate sufficient climate benefits, alongside many other factors considered by an IFI, projects may not be supported. In addition, systems that are already low carbon may in fact be in less need of finance than grids that are higher carbon but need investment to expand.

The problem for EMDEs is that much of the necessary capacity expansion has not yet taken place, but rather is expected to do so in the coming years as demand increases. Therefore, a focus on historical or existing systems (as per the EU Taxonomy) makes investments in many grid systems difficult where their current status is high carbon.

In addition to general challenges concerning approach coverage, there are some technical challenges that have been flagged by respondents. Firstly, a barrier for the EU Taxonomy based approach is when considering a sub-national component of the grid, finding data can be difficult (with datasets predominantly held at the national level). An additional challenge raised is where the grid is highly meshed (multiple connections within the system), and therefore identifying the role of a specific project in evacuating renewable electricity may be difficult to estimate. A further challenge identified for the Common Principles approach is the non-availability of robust power system expansion or decarbonisation plans.

Finally, the absence of definitive approaches for organisations that provide concessional finance is also recognised as a potential limitation, in that IFIs making grid investments that also require such finance are unclear how to access it. For example, climate funds may not have a definitive approach to determine whether a project will result in CO_2 reductions, and therefore whether funds can be released.

Potential changes to approaches

Following a period of adopting and implementing approaches, the survey also asked what specific changes to approaches were under consideration, motivated by challenges faced to date. After a two-year period, MDBs and members of IDFC agreed that minor changes could be considered but that more substantive changes could be made only after 5 years. Current issues include whether eligibility criteria may be too strict, in that they too strongly favour systems that are already low carbon. However, a question remains as to whether such issues may be substantive and therefore fall outside of any process of minor revisions.

Based on the EU Taxonomy approach, the CBI are also considering how they could include forward-looking criteria, so that the coverage of potential grid projects increases. This could include incorporating a forward-looking element, such as adding the pipeline of near term projects into the criteria on capacity additions. However, the challenge is ensuring that the criteria used can be easily applied, and are fully verifiable and robust.

The role of modelling

In the survey, participants were also asked about the role of modelling as part of their approaches to determining financing of grid projects. This question was motivated by a view that modelling could play an important role in identifying and screening projects for investment, including estimating the emission reduction potential of those projects. This might be particularly important for those managing climate funds who need to clearly understand the mitigation impact of the grid investment.

One issue raised was that the clarity of the criteria and the consistency of their application could risk being undermined by the introduction of modelling, notably for the EU Taxonomy-based approach. The Common Principles approach does rely on power sector or decarbonisation plans that are usually model-based, and which may be supplemented by MDBs where the time horizon of the plan is deemed too short. Once a project has been deemed eligible or sufficiently eligible on climate-related metrics, modelling would tend to focus on financial modelling to assess economic feasibility of projects, and on technical modelling (e.g. PLEXOS) to understand system wide impacts of the project. This would be done as part of a detailed assessment of whether to go ahead with financing the project.

4. Further developing approaches to mobilise climate finance

Going forward, it will be crucial that IFIs use approaches that are inclusive for those EMDEs that will require large-scale grid investment in the coming years for decarbonisation, both in country systems but also interconnection between countries. Here, we highlight some specific issues that could be important in helping mobilise more climate finance, and which can feed into ongoing discussions across the financing community in relation to climate finance approaches.

Increasing concessional financing: *The potential role for modelling in the screening process for project investments and the identification of their impacts*

Concessional finance will be crucial to de-risking investment and enabling new grid projects in specific countries. A key source of this finance is likely to be from climate funds such as the GCF. However, not all these organisations have an agreed methodology for determining whether a grid project is going to lead to measurable emission reductions, which is a key important metric alongside others such as economic benefits and system resilience. Without a robust approach in place, the necessary concessional finance that may be needed is likely to be delayed or not forthcoming.

In this context, there is a credible role for energy systems modelling to be integrated into an approach for project screening and initial assessment of the impact of grid projects on emission reductions, electricity transmission, and investment requirements. Scenarios can be used to assess systems with and without the project investment, to explore the impact of the investment on renewable generation enabled, flow of electricity, and changes to GHG emissions. Another modelling approach would be to assess an electricity system under climate policy and assess whether different interconnection or grid projects would be needed as part of that system (i.e. were selected), or the difference specific projects would make to achieving such climate policy. Key to this approach, to ensure outcomes, could be monitoring of estimated reductions once the project investment has been made.

This scenario analysis could also be used by countries (governments, utilities) or regional entities (power pool organisations) who would like to request climate finance from different

funds. An example of the application of such modelling was in a study using both OSeMOSYS Global[32] and PLEXOS-World for assessing the impact of an interconnection between the Gulf region and India.[33] The OSeMOSYS Global model is currently being used to explore the climate benefits of the ZiZaBoNa (Zimbabwe, Zambia, Botswana, and Namibia) interconnector projects in Southern Africa, and it is set up for application to all other global regions.

For MDBs and other IFIs that undertake more detailed modelling when assessing feasibility, this type of modelling could still provide a useful early screening approach. This would help address the criterion set out in the Common Principles that states that 'the entity applying the Common Principles shall demonstrate that the investment will not significantly increase GHG emissions over the short or medium term'.[34]

Revisiting existing climate finance criteria across both the EU Taxonomy and the Common Principles

There is a recognition that these approaches have provided a good basis for defining grid projects as 'climate compatible'. This is important as investors are looking for climate aligned projects and IFIs are looking to increase the share of their financing as climate focused.[35] There is, however, a concern, as reflected by different organisations in the survey, that some climate finance criteria may be too restrictive in terms of coverage of what project finance is eligible for or defined as climate finance. This was highlighted as a concern in the previous 2021 CCG/GGI Paper.[36] As organisations take stock of the approaches used, there are several ideas to amend criteria to broaden coverage whilst maintaining credibility of approach.

The EU Taxonomy approach includes the criteria that state that grid eligibility can be based on a system where more than 67% of newly connected generation capacity is below the generation threshold value of 100 gCO2e/kWh. Criteria could be amended to not only consider the previous 5 years of data, but to consider planned investments. This could be 2–3 years of planned generation project investment and 2–3 years of historical investments. The question would be how far forward planned projects could be considered, and at what stage of the planning process should they be in order to be included. Further research to assess the impact of this amended approach on project coverage would be useful to understand how impactful this change might be.

For the Common Principles approach, there are elements that seem critical in relation to greenfield investment, such as 100% attribution for lines that are dedicated to evacuating renewables and 0% attribution to those that only support fossil fuel-based supply. One area that could be considered for amendment, which would better reflect efforts on renewable investment in the future, would involve considering very low carbon (VLC) capacity additions over the planning period, in addition to the final share of VLC at the end of the planning period. Currently, greenfield investments have climate finance attribution determined completely based on the projected share of low carbon generation in the coming years up to

[32] Barnes, T., Shivakumar, A., Brinkerink, M. et al. OSeMOSYS Global, an open-source, open data global electricity system model generator. Sci Data 9, 623 (2022).
[33] Shivakumar, A., Kruitwagen, L., Weinstein, M., et al. A techno-economic and financial analysis of a Gulf-India undersea electricity interconnector, 13 July 2021, Preprint (Version 2) available at Research Square.
[34] MDBs and IDFC (2021). Common Principles for Climate Mitigation Finance Tracking. MDBs and International Development Finance Club, p. 12.
[35] Fankhauser, S., Srivastav, S., Sundvor, I., et al. Net Zero Portfolio Targets for Development Finance Institutions: Challenges and Solutions. The Smith School of Enterprise and the Environment and the Climate Compatible Growth Programme, 2023.
[36] Pye, S., Shivakumar, A., and Price, J. (2021). Climate finance for grid investments in emerging and developing economies. Climate Compatible Growth Programme, November 2021.

a decade. This could be amended so that some weighting (for example, 50%) would be allocated to the share of capacity additions that were VLC over the planning horizon. The other 50% weighting would remain as a metric to capture the share of VLC generation at the end of the planning horizon. The benefit of this approach is that it provides stronger recognition (or weighting) to the decarbonisation efforts over the planning horizon, not just to the VLC share at the end of the period.

As described earlier, unlike the EU Taxonomy that defines whether a project is eligible or not, the Common Principles determine what percentage of the project investment is climate finance attributable. IFIs will then consider this percentage level to inform their investment decision alongside many other factors. It is unclear at what level specific percentages become problematic when considering the climate benefits of projects, and how this differs between organisations. Going forward, and if not already done, there could be more context specific consideration given to developing countries with lower levels of VLC to ensure that climate attribution criteria do not overly constrain investment decisions (recognising that it is one of many factors in taking an investment decision).

In summary, there is a recognition that climate finance criteria can be an enabler of investments in grids but require flexibility so that specific countries and regions do not get overlooked. This flexibility, however, needs to be balanced against the need for ensuring credible criteria that will lead to system decarbonisation, have clarity of approach, and are easily implementable. As IFIs and other funders continue to refine the approaches used, keeping in focus the need to massively scale financing in this crucial sector will be vital if energy systems are to be decarbonised.

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Asian Development Bank (ADB)
African Development Bank (AfDB)
European Investment Bank (EIB)
GridWorks
Agence Française de Développement (AFD)
Climate Bonds Initiative (CBI)
Green Climate Fund (GCF)
UN Economic and Social Commission for Asia and the Pacific (UNESCAP)
International Renewable Energy Agency (IRENA)
International Energy Agency (IEA)

Appendices

Appendix 1. Overview of different approaches to determining climate finance for grid projects

	COMMON PRINCIPLES	EU TAXONOMY
Overview	Principles that set out 'definitions and guidelines and a list of eligible activities that allow for consistent accounting and reporting of financial flows identified as climate change mitigation finance'. (p. 2)	Framework developed to help project developers and investors 'navigate the transition to a low-carbon, resilient and resource-efficient economy'. (p.2)
Organisations using approach	MDBs, members of IDFC	CBI
Approach to designating investment as climate finance	A system that is increasing its share of very low carbon electricity over the planning horizon of up to 10 years.	All electricity transmission and distribution infrastructure or equipment in Systems which are on a trajectory to *full decarbonisation.*
Criteria - general	**Greenfield:** Financing shall be apportioned using the projected share of VLC electricity in the electricity being transported in the entire electricity system in which the activity will be undertaken at the end of the planning horizon [up to 10 years]. **Brownfield:** Eligible projects, including those that modify existing facilities, equipment, appliances, systems or processes, need to 'demonstrate a substantial improvement in energy efficiency or a substantial reduction in net GHG emissions' through supply chain improvements, reductions in overall consumption (e.g. reducing T&D technical losses), or implement 'measures to improve network stability to increase consumption of very-low-carbon electricity'. (p.14)	*Full decarbonisation* is defined as either a system where more than 67% of newly connected generation capacity is below the generation threshold value of 100 gCO2e/kWh, on a PCF (Product Carbon Footprint) basis, over a rolling five-year period OR where the average grid emissions factor is below the threshold value of 100 gCO2e/kWh measured on a PCF basis, over a rolling five-year average period.
Criteria – direct connection	Transmission or distribution project dedicated to the evacuation of only very low carbon (VLC) electricity (excl. Nuclear) shall be fully eligible.	Fully eligibility for direct connection, or expansion of existing direct connection, of low carbon electricity generation below the threshold of 100 gCO2e/kWh declining to 0 gCO2e/kWh in 2050, measured on a PCF (Product Carbon Footprint) basis, to a substation or network.
Criteria - interconnection	Where the activity involves an interconnection between electricity systems, the entity applying the Common Principles shall demonstrate that the investment will not significantly increase GHG emissions over the short or medium term. The weighted average share of VLC electricity across both systems is used for apportioning the financing.	Interconnectors between transmission systems are eligible, provided that one of the systems is eligible.
Criteria – mini/micro-grids	Isolated mini-or micro-grids that are not connected to the transmission system may be treated like network investments associated with generation. Financing is proportional to the share of VLC energy in the mini-or micro-grid.	
Criteria type	Forward-looking, eligibility criteria determining % climate finance.	Historical data, binary criteria.
Evidence needed of grid decarbonisation	Ex-ante assessment of forward-looking power system plans (or national decarbonisation plans), using a planning horizon of up to 10 years.	Assessment of historical or current year published data on grid intensity or capacity additions.

Appendix 2. Survey sent to Working Group members

The following questions were included in a survey sent to GGI Climate Finance Working Group members during October 2022.

- What is the name of your organisation?
- What type of organisation are you?
- What region(s) do you focus on?
- What types of financing do you provide for grid projects? (e.g. loans, private equity, bonds etc.)
- What are the main challenges to grid financing in LMICs that you face? (This is in general, not just related to climate finance)
- In summary, what is your approach (methodology) to determining a climate finance attributable grid project investment?
- Using this approach, what are the specific steps of assessing a grid project, from initial consideration to final investment decision? Please could you provide case study examples to help better understand the process of implementation.
- What are the advantages of this approach?
- What are the challenges with implementing this approach? Please use case studies to help elaborate on key challenges.
- From experience of implementing this approach, what aspects of your approach (if any) are you re-considering? Please outline any challenges associated with possible changes.
- Is there a subsequent process of monitoring, reporting and verification after the investment has been made? What does this look like?
- Is modelling used as part of the decision-making process? If yes, what type of model and what are its main outputs?
- Is there any additional information that you would like to add that you think is pertinent to the above issues?

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The Open University

Imperial College London

Loughborough University
STEER – Centre for Sustainable Transitions: Energy, Environment and Resilience

Climate Parliament

Centre for Global Equality

UCL

KTH Vetenskap och Konst

University of Cambridge