OECD Blended Finance Guidance for Clean Energy

POLICY PERSPECTIVES

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Abbreviations and acronyms

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
ASEAN	Association of Southeast Asian Nations
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
BOOT	build-own-operate-transfer
CBI	Climate Bonds Initiative
CCUS	carbon capture, utilisation and storage
DAC	OECD Development Assistance Committee
DFI	development finance institution
EBRD	European Bank for Reconstruction and Development
EDE	emerging and developing economies
ESCO	energy service company
ESG	environmental, social and governance
ETM	Energy Transition Mechanism
EV	electric vehicle
FCDO	UK Foreign, Commonwealth & Development Office
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GSSS	green, social, sustainability and sustainability linked (bond)
GW	gigawatt
IDB	Inter-American Development Bank

IEA	International Energy Agency
IFC	International Finance Corporation
IPO	initial public offering
IRENA	International Renewable Energy Agency
IRR	internal rate of return
JETP	Just Energy Transition Partnership
JICA	Japan International Cooperation Agency
LED	light-emitting diode
LSE	London Stock Exchange
MDB	multilateral development bank
MIGA	Multilateral Investment Guarantee Agency
Mt	megatonne (CO_2)
MW	megawatt
NGO	non-governmental organisation
NZE	net zero emission (scenario)
ODA	official development assistance
PPA	power purchase agreement
PSI	private sector instrument
PV	photovoltaic
SDG(s)	Sustainable Development Goal(s)
SDS	Sustainable Development Scenario
SME	small and medium-sized enterprises
SPV	special purpose vehicle
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

Executive summary

Meeting the Paris Agreement goals will require a huge and rapid scaling of finance from all sources towards climate action. The energy sector, which accounts for around three-quarters of emissions, will require the lion's share of investment. The financing needs in emerging and developing economies (EDEs) – where energy needs are projected to grow rapidly – are particularly acute and pressing. Investment in clean energy in EDEs will need to reach USD 1 trillion a year by the end of the decade (IEA, 2021[1]).

The scale of the challenge is such that all sources of finance – public, private, domestic and international – need to be mobilised rapidly towards clean energy. In particular, the huge stocks of global commercial capital need to be tapped more effectively, to match investor demand for sustainable investments with projects on the ground. Significant barriers to commercial investment, both general and sector-specific, in EDEs remain, however. Scarce development finance needs be deployed more efficiently and catalytically to overcome these barriers and mobilise commercial finance. Blended finance – the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries – is a critical tool to this end.

A significant shift of development finance towards private capital mobilisation, including through blended finance, would help maximise its impact. Though the clean energy sector receives a significant portion of climate finance provided by developing country donors, and accounts for most of the commercial finance mobilised by development finance, overall mobilisation figures are still relatively low: just under USD 6 billion of commercial capital mobilised towards renewable energy and a total of USD 14 billion mobilised by all climate finance in 2019 (OECD, 2021[2]). A shift from traditional development assistance models towards blended finance would multiply the impact of scarce development finance and allow it to be recycled more rapidly into new frontier projects once existing investments are commercially viable and sustainable.

A more nuanced understanding of the underlying barriers to commercial investment can maximise the development impact and financial additionality of development and blended finance. Blended finance interventions need to be tailored to project, sector and country specific risks, and deployed as part of a wider suite of enabling measures. The nature of risks, market failures, and wider barriers to investment will vary markedly across projects and different country contexts. The features that give rise to the requirement for blended finance will often reflect local circumstances, rather than the technology in question. Blended finance interventions therefore need to be designed on a case-by-case basis, reflecting these risks, and not presuppose the suitability of particular instruments. This, in turn, requires project developers and commercial financial institutions to have a better understanding of the facilities, structures, and instruments on offer, as well as a streamlining of the ecosystem to make the process of seeking blended finance more efficient. The major clean energy sub-sectors face a number of common risks, which tailored blended finance interventions can help overcome:

- ***Off-grid clean energy systems***, for example small solar photovoltaic units and mini-grids, can have an enormous development impact, and can be deployed relatively cheaply and quickly. The major barrier to investment is project scale: individual projects are often too small to attract the interest of investors. Blended finance can be used to address this by facilitating the aggregation of

small projects into larger, investable and tradeable assets. Given their outsized development impact and their importance in countries with the highest barriers to commercial investment, there is a strong case for blended finance on relatively more concessional terms with longer durations for off-grid clean energy systems.

- ***Energy efficiency*** faces a number of barriers to commercial investment, including the profile of project developers – often individuals or SMEs – with constrained access to finance, and the nature of investments, which yield incremental savings over time rather than direct revenue streams. Blended finance can help unlock commercial finance by supporting the aggregation of small loans towards efficiency investments into larger products, supporting local financial institutions to access refinancing through green bonds, through the financing of preferential mortgages for more efficient buildings, and by demonstrating new business models such as energy service companies. Policy support to strengthen regulatory environments needs to complement any deployment of blended finance, for example through wider and more stringent minimum energy performance standards.
- ***Utility-scale renewables*** are increasingly competitive with incumbent technologies. Nevertheless, significant barriers to investment remain, particularly in frontier markets, owing to the scale and lifespans of projects. Barriers are multifaceted, reflecting the complexity of projects and the large number of actors typically involved. Blended finance can be tailored to specific risks at different stages of the project cycle: grants for project preparation and development, as well as equity, in the early stages; guarantees and risk insurance during the construction phases; and revenue guarantees during the operational stages. Blended finance needs to be deployed as part of a wider suite of support measures and requires strong systems of governance and co-ordination to ensure policy coherence, for example alongside the retirement of coal generation and phasing out of fossil fuel subsidy.
- ***Other clean energy and integration*** technologies, including green hydrogen, carbon capture, utilisation, and storage (CCUS), and energy storage, are closer to the technological frontier. The use of blended finance therefore needs to be considered carefully, since projects often do not have a clear route to commercial sustainability. Nevertheless, blended finance, for example in the form of viability gap funds, revenue sharing, and partial risk facilities can help attract investment and establish proof of concept in more nascent sectors.

The rapidly changing economics of the clean energy sector requires development actors to take a dynamic approach to their interventions. Many clean energy investments already provide strong value propositions for investors and compete on cost and returns with incumbent technologies. The growth of the sector also means risks and other barriers to investment are better understood and navigated. However, the huge investment potential in clean energy is a global phenomenon, with plentiful opportunities for institutional investors in advanced economies as well as in emerging and developing economies. The challenge for development finance in general, and blended finance in particular, is therefore to ensure that it provides enough incentive to commercial finance to invest in frontier markets, but without crowding-out private investment.

1 Introduction, context and policy lessons

Meeting the Paris Agreement goals of limiting global warming to 1.5°C by the end of the century, while pursuing climate-resilient development, will require an unprecedented mobilisation of finance. The financing needs to meet these goals are particularly acute in emerging and developing economies. The scale and complexity of the challenge is compounded by Covid-19 recovery needs, as well as longer-term development needs under the 2030 Agenda for Sustainable Development. Meanwhile, there remain myriad long-standing barriers to infrastructure investment and wider climate finance, and the use of scarce development finance to effectively mobilise commercial capital remains far below its potential.

The scale of the challenge is such that all sources of finance – public, private, domestic, and international – need to be mobilised at scale. In particular, the huge stocks of global commercial capital need to be mobilised at scale towards more productive uses. Global finance is increasingly in search of investments to support the transition, as well as the enabling measures required to make them viable, and policy certainty by governments on the shape of the transition (GFANZ, 2021[3]) (Sustainable Markets Initiative, 2022[4]). This requires development finance to play a catalytic role in the mobilisation of commercial finance towards underserved sectors and geographies. Blended finance – the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries – has a critical role to play in this endeavour, by helping to de-risk investments and supporting effective public-private cooperation on the ground. In light of this potential, the OECD's Development Assistance Committee (DAC) developed a set of comprehensive principles to support development actors to most effectively leverage commercial capital through development finance (OECD, 2021[5]).

While finance will need to be mobilised at scale to support climate mitigation and adaptation in all sectors, the energy sector[1] – which accounts for around three-quarters of global greenhouse gas emissions (IEA, 2021[1]) – will require the lion's share of investment. Investment towards clean energy is particularly constrained in emerging and developing economies (IEA, 2022[6]), despite its huge potential decarbonisation and developmental impacts. The international donor community is making support for the clean energy transition a central pillar of their development strategies, as part of their wider efforts to support the development and implementation of robust national determined contributions (NDCs) to emissions reduction. The OECD DAC committed in October 2021 to align development cooperation with the goals of the Paris Agreement, including by prioritising support for technologies focused on accelerating progress towards net zero systems, in particular renewable energy and energy efficiency (OECD, 2021[7]). At the same time, donors and beneficiary countries are increasingly calling for a rapid scaling of private capital mobilisation, including through blended finance, to help close the global clean energy financing gap (UN, 2021[8]).

[1] Including electricity generation, efficiency, heating, and other end-use including industry and transport.

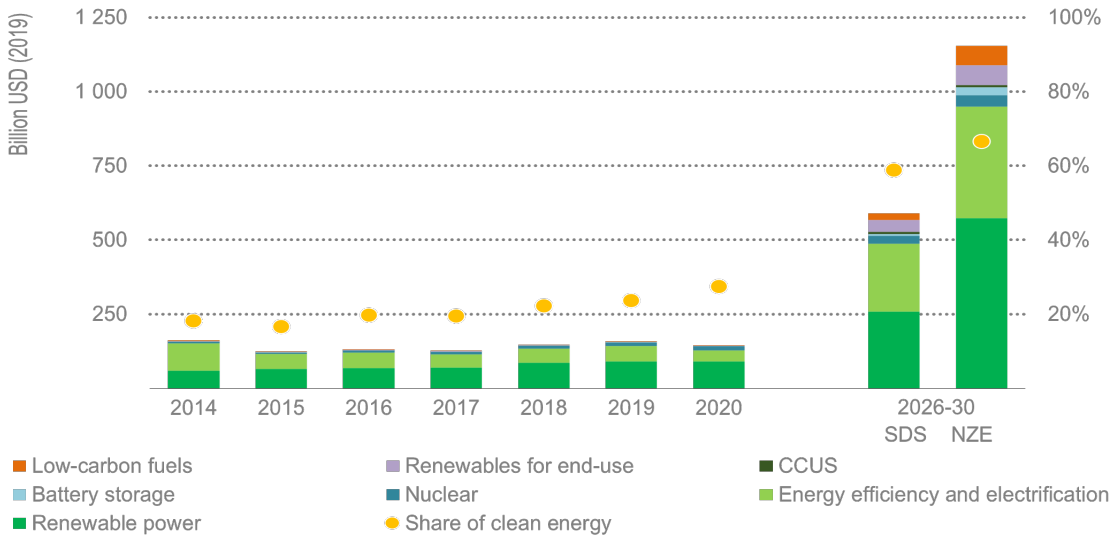
The global clean energy financing gap

The financing needs for clean energy investment in emerging and developing economies are huge. Investment from all sources will need to grow seven-fold, from USD 150 billion in 2020 to over USD 1 trillion a year by the end of the decade to keep the world on track to a 1.5°C pathway (IEA, 2021[1]). Meeting a net zero pathway will require a step-change in investment in emerging and developing economies, which accounts for a relatively small portion of global investment in clean energy. Moving from this low base will require a rapid acceleration of investment in emerging and developing economies, which has been relatively stagnant over the past decade, against a wider global picture of rapidly increasingly clean energy investment (IEA, 2022[6]), as illustrated in

Figure 1.1 and Figure 1.2 below. Investment in the power sector alone needs to grow at a rate of more than 25% annually, compared to a 3% average growth rate seen over the past few years (IEA, 2022[6]).

Figure 1.1. Emerging and Developing Economy (EDE) clean energy financing needs

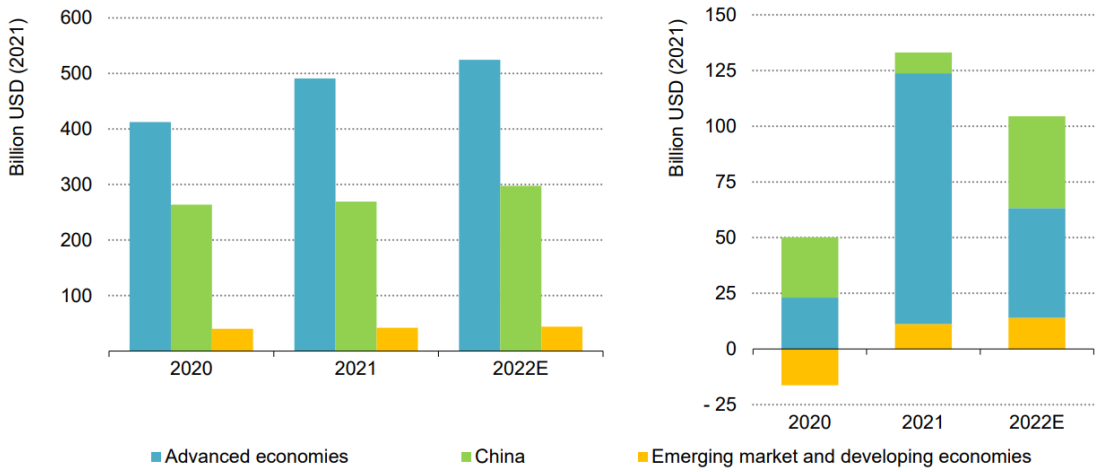
Clean energy investment in EDEs compared with projections in the IEA Sustainable Development Scenario (SDS) and Net Zero Emissions by 2050 Scenario (NZE)



Source: International Energy Agency (2021, Financing Clean Energy Transitions in Emerging and Developing Economies 2021, IEA, Paris.

Figure 1.2. Global clean energy investment trends

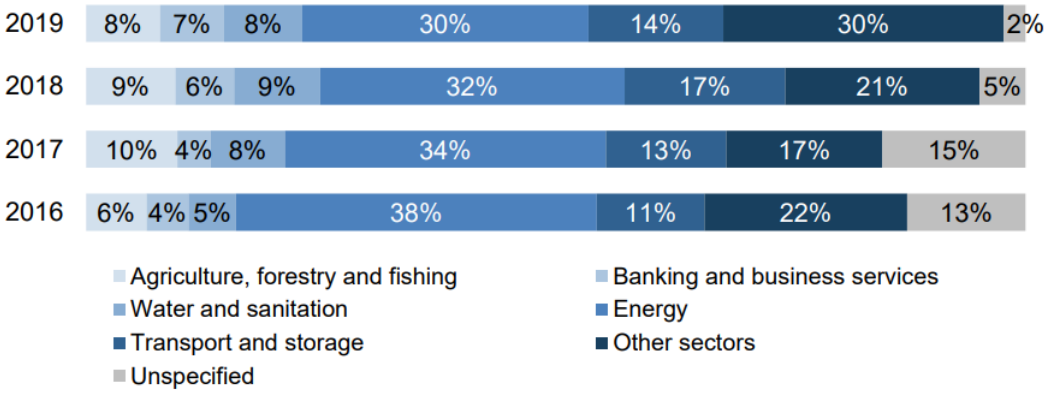
Per-capita clean energy investment (left) and annual change in clean energy investment (right), by region, 2020-22E



Source: International Energy Agency (2022), *World Energy Investment 2022*

The energy sector receives a significant portion of climate finance provided by developing country donors (see Figure 1.3, below). The sector accounts for most of the commercial finance mobilised by development finance, but overall mobilisation figures are still relatively low: just under USD 6 billion of commercial capital mobilised towards renewable energy (see Figure 1.4, below); and a total of USD 14 billion mobilised by all climate finance in 2019 (OECD, 2021[2]).[2]

Figure 1.3. Sectoral split of climate finance provided and mobilised

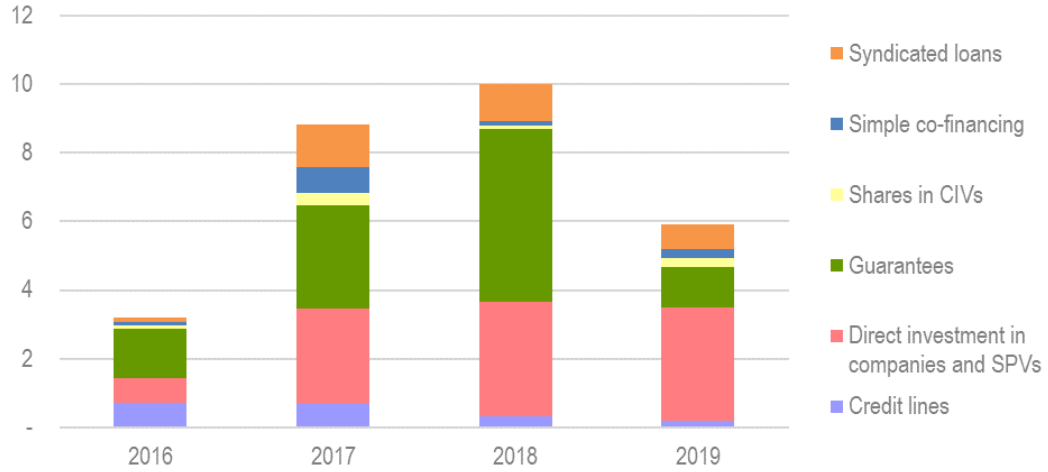


Source: (OECD, 2021[2]), *Climate Finance Provided and Mobilised by Developed Countries: Aggregate trends updated with 2019 data, Climate Finance, and the USD 100 Billion Goal*

[2] The latter two figures refer to commercial finance mobilised by climate finance attributed to developed countries.

Figure 1.4. Commercial finance mobilised towards renewable energy investment

Private finance mobilised by instrument (USD billion)

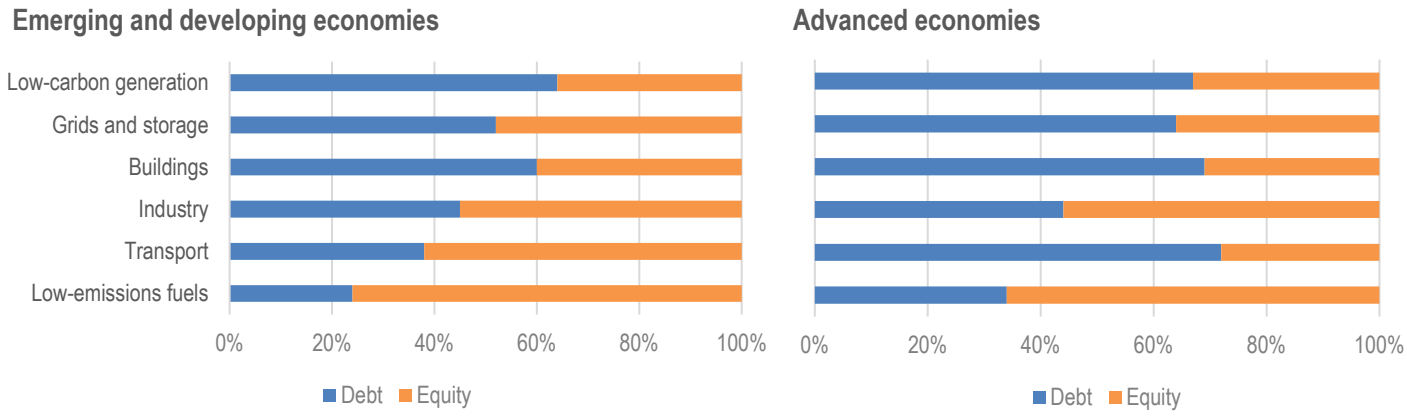


Source: OECD Data

The clean energy sector faces a number of constraints to investment, compounding long-standing barriers to infrastructure investment that exist across traditional infrastructure assets. These include, among others: the prevalence of fossil fuel subsidies that distort competition in favour of conventional energy sources and can make energy efficiency investments less attractive; a lack of in-country capacity to shift to lower carbon technologies; and high up front capital costs and the long life-cycles of energy assets, posing financing challenges that can make the prospective return profile unattractive to commercial investors and result in difficulties in securing long-term finance for projects. The rapid pace of change in the sector, including the emergence of new technologies, makes the investment dynamic particularly complex, requiring careful consideration of where best to deploy scarce domestic and development finance, in a way that optimises the additionality of development finance, manages market failures, and is sensitive to local contexts.

Clean energy investments in EDEs are reliant to a greater extent on equity than debt in EDEs as compared to advanced economies (see Figure 1.5, below). This is a function of weaker macroeconomic and investment climates, and shallow local capital markets, which increase the cost of borrowing.

Figure 1.5. Typical capital structure of clean energy investments in emerging and developing economies and advanced economies



Source: (IEA, 2021[9]), *The Cost of Capital in Clean Energy Transitions*

Scope of the guidance

In light of these challenges – a huge clean energy finance gap, with low relative and absolute shares of commercial investment – there is a need to better understand how the deployment of scarce development finance can be optimised to mobilise the greatest scales of commercial capital, particularly in emerging and developing economies. Blended finance – the strategic use of development finance for the mobilisation of additional finance towards sustainable development – is one potential solution, but its effective deployment requires a comprehensive understanding of project, sector, and country contexts.

This guidance will explore specific features of clean energy projects, and the wider transition, to draw lessons for donors, policymakers in beneficiary governments, and financial institutions on whether and how best to deploy blended finance in the sector. It will follow the methodology and framework of the OECD DAC's Blended Finance Principles. In light of the huge clean energy financing gap and need to mobilise private capital towards the transition, this guidance will focus on Principle 2: *designing blended finance to increase the mobilisation of commercial finance*, whilst recognising the close inter-dependencies of the other four principles (summarised in the subsequent section), components of which feature as necessary conditions for the effective mobilisation of private capital.

The set of sector-specific considerations for blended finance considered in this paper is by no means exhaustive; clean energy refers to a vast array of economic activity, ranging from electricity generation and powering industry, to transport and the heating of homes. This paper will explore blended finance considerations for off-grid clean energy systems, energy efficiency, utility-scale renewables, and a number of other clean energy and integration technologies, including battery storage, green hydrogen, and carbon capture, utilisation and storage. It will not explore the use of blended finance in wider clean energy technologies or associated technologies that will be critical to the transition, such as bioenergy, nuclear, critical materials, or wider supply chains.

The guidance draws on findings from consultations with experts from donor governments, development finance institutions, and multilateral development banks and funds; private sector financial institutions and project developers; beneficiary country governments, development banks, and governmental agencies; and from academia and the NGO community. The authors drew on their perspectives through a number of bilateral consultations and two workshops, and on contributions outlining real world examples of the deployment of blended finance towards clean energy cited in the case studies throughout this paper.

The remainder of this section will set out some of the key policy lessons drawn throughout this paper. Chapter 2 will then revisit OECD DAC Blended Finance Principle 2: *designing blended finance to increase the mobilisation of commercial finance*, applying the sub-principles of additionality, mobilisation, concessionality, and commercial sustainability – to clean energy. Finally, Chapter 3 will explore certain sector-specific considerations for the deployment of clean energy in greater detail, setting out the considerations development practitioners can make to help inform better decision-making on, and ultimately maximise the development impact of, blended finance interventions.

Policy lessons

Blended finance interventions need to be tailored to project, sector and country specific risks, and need to be deployed as part of a wider suite of enabling measures

Despite some of the common features of clean energy projects identified in this paper, the nature of risks, market failures, and wider barriers to investment will vary markedly across projects and different country contexts. The features that give rise to the requirement for blended finance will often reflect local circumstances, rather than the technology in question. Blended finance interventions therefore need to be designed on a case-by-case basis, reflecting these risks, and not presuppose the suitability of particular instruments. This, in turn, requires project developers and commercial financial institutions to have a better understanding of the facilities, structures, and instruments on offer, as well as a streamlining of the ecosystem to make the process of seeking blended finance more efficient (see below on governance, co-ordination, and institutional arrangements).

Project objectives should be a key consideration informing whether and how to deploy blended finance. A higher degree of concessionality and longer duration interventions may be justified where projects' development impacts are higher, for example where they are intended to support industrial capacity (for example through industry access to renewably generated grid-connected power), to support energy access for households (for example through off-grid generation), or to support local job-creation (for example through investment in efficiency). This also underscores the importance of systems approaches, whereby the financial case of an individual project is made with reference to its wider economic and social benefits, including but not limited to climate action and decarbonisation.

As with other sectors, the deployment of blended finance needs to be accompanied by wider measures addressing the underlying market failures that deter commercial investment (and create the need for public involvement). As discussed, many of these will be general and apply to all infrastructure investment in a jurisdiction. At the same time, there are often policy and regulatory barriers facing clean energy investment that need to be addressed (for example land access and permitting, and the prevalence of fossil fuel subsidies) or specific mechanisms that need to be developed and rolled-out (for example legal frameworks that streamline power purchase agreements, contracts for difference, or public-private partnerships in the energy sector) in order to make commercial investment viable.

The rapidly changing economics of the clean energy sector requires development actors to take a dynamic approach to their interventions

Many clean energy investments already provide strong value propositions for investors and compete on cost and returns with incumbent technologies. This is particularly the case for more mature technologies, including utility-scale renewable technologies like wind and solar. Though costs of some clean energy inputs have increased over the past year due to global economic shocks (IEA, 2022[6]) the longer-term trend is of rapidly declining input costs. The growth of the sector also means risks and other barriers to investment are better understood and navigated. However, the huge investment potential in clean energy is a global phenomenon, with plentiful opportunities for institutional investors in advanced economies as

well as in emerging and developing economies. Where returns are similar, and risks – perceived or actual – are higher, international finance will naturally flow to more mature markets and jurisdictions. The challenge for development finance in general, and blended finance in particular, will therefore be to ensure that it provides enough incentive to commercial finance to invest in frontier markets, but without crowding-out private investment.

These assessments will be difficult, both due to the dynamism and rapid change of the sector, and because they will be informed to a large extent by local circumstances. As discussed throughout this paper, ensuring minimum concessionality – both for the sake of protecting well-functioning commercial markets, and to preserve development finance – will require robust ex-ante assessments of the specific nature of barriers to investment that blended finance is designed to address. It also requires project developers and blended finance providers to have clear benchmarks and indicators against which they can judge whether projects are able to sustain themselves without continued public involvement. Finally, blended finance needs to be tailored even within individual projects to address different risks at different points in time.

The nature, composition, and distribution of development finance needs to shift rapidly and at scale towards private capital mobilisation

The aggregate availability of finance, instruments and structures for blending remains low, and the ecosystem for accessing what is available is complex and often bureaucratic. Addressing these issues – the availability of and access to finance – to accelerate the mobilisation of commercial finance requires donors to alter the political and financial incentives of MDBs and DFIs away from their traditional business models, and equip them with the governance systems to rise effectively to the global sustainable development challenge. This will require a number of shifts (OECD, 2022[10]):

- A common definition of blended finance would provide increased clarity. The DFI Working Group's definition of blended finance places emphasis on the concessional element of blended finance – typically implying below market returns – allowing concessional funds to blend with the DFI's own financing and that of others (AfDB, AsDB, AIIB, et al., 2017[11]). Conversely, the OECD Development Assistance Committee (DAC) definition focuses on the mandate of the organisation, rather than on the sources of capital that encapsulate, amongst other factors, concessional and non-concessional pricing. The OECD definition is wider as it includes all funds received through ODA but also the capital base of the organisation. By capturing this greater financial capacity, the definition aims to encourage further mobilisation efforts, along with greater development impact, as blending can now take place along a wider number of projects and portfolio, providing a greater breadth of risk mitigation.
- More transparency on risk, return and development impact is necessary for blended finance to become more effective. By contrast with the transparency and openness of ODA, the risk return data of blended finance transactions remains hidden behind commercial clauses of confidentiality. For donors, MDFIs' and DFIs' greater knowledge on returns would help ensure that risks are covered, but profits not subsidised. Similarly, greater transparency is needed on the measurement and management of impact, amid the confusion stemming from the multitude of initiatives, frameworks, and measurement methodologies.
- DFI and MDB incentives to mobilise the private finance for sustainable development must be made more coherent with their mandates. Ministries of Foreign Affairs and development finance providers are tasked by the governments of high-income countries to help low and middle-income countries reach their SDGs, but Ministries of Finance and Treasuries, along with credit rating agencies, control the risk exposure and, critically, the incentives of MDBs and DFIs to deliver on that mandate. As a result, these institutions often must generate both sustainable impact and a financial return, which is not always compatible. In such cases, returns are likely to take priority over impact, the outcome being that the sector or region targeted, as well as the type of blended finance structure

or instrument deployed, are likely to have some element of a trade-off between financial return and development impact. There may for example be a preference by MDBs or DFIs to use credit lines over shares/equity, which are likely to require further capital buffers, thereby constraining balance sheets. Donors can recapitalise MDBs and DFIs but ultimately balance sheets and capital risks are controlled by Ministries of Finance/Treasuries, who can decide on whether they can have a credit rating and issue debt, as well as the capacity to use instruments such as guarantees. Currently the risk dial is focused largely on financial returns.

Donors more widely should also take a flexible approach to blended finance interventions, tailoring instruments to best address the specific challenges at hand. A large portion of donor assistance in blended finance, especially through MDBs, takes the form of returnable capital, typically concessional loans. While such instruments can be impactful in some circumstances, their use can often be relatively inflexible, for example requiring deployment to senior debt. Pure grant contributions from donors, including through multilateral institutions and funds, can often achieve the same financial and development additionality as concessional loans – i.e. by lowering the cost of capital and helping projects overcome the commercial viability threshold – with the same costs of funds to the borrower, whilst using a considerably smaller amount of development finance. Grants can also offer greater flexibility than concessional loans, for example by being directed to periods of projects stress, or by being used for performance payments to encourage delivery of climate or other objectives.

Strengthening co-ordination, governance, and institutional arrangements will be critical to optimising the effectiveness of blended finance

Financial institutions globally are rapidly committing to aligning their portfolios with the Paris Agreement goals. These commitments will shape their investment decisions, and there are already signs that global capital is shifting at pace away from business as usual. Ensuring it is redirected towards the clean energy transition and wider climate action will require concerted action from governments and international financial institutions.

At the highest level, governments setting ambitious Paris-aligned nationally determined contributions (NDCs) and long-term strategies, including net zero commitments, can provide a strong signal of intent to investors. Doing so creates a benchmark against which all domestic investments can be measured. This requires, however, buttressing long-term economy-wide targets with clear, credible, and actionable sector-level targets, including targets for the roll out of renewable energy and retiring of fossil fuel electricity generation, zero carbon heating, phasing out of internal combustion engine vehicles, wider transport electrification, industrial decarbonisation, and building retrofitting and other efficiency measures. These sector targets, in turn, will often need to be underpinned by regulation, for example higher minimum energy performance standards, buildings efficiency standards, and restrictions on the sale of new internal combustion engine vehicles. Regulation will often need to be combined with wider enabling measures, including the phasing out of fossil fuel subsidies, adequate carbon pricing, and tax and other fiscal incentives for clean energy.

The clean energy transition will be complex and multifaceted, owning to the all-encompassing nature of energy infrastructure. Decisions on electricity generation, for example, will need to be intimately tied to wider plans for industrial development, transport and industrial decarbonisation, and investment in wider social and economic infrastructure. Sector-level strategies therefore need to be developed in a coherent way, working through tensions, and exploiting synergies across different sectors. This requires strong central oversight and strategy from government, given the large number of public and private sector stakeholders involved. The following list of government stakeholders provides an overview of the various interests that may need to be involved in the development of such strategies:

- **Central executive offices**: central departments with a direct link to the head of government may be responsible for developing and setting high-level strategy, ensuring robust co-ordination

amongst the various governmental stakeholders, and ensuring whole-of-government accountability to the head of government and cabinet.

- **Ministries of energy, electricity, and environment:** responsible for energy and electricity policy, typically develop detailed sector-level plans, including decarbonisation strategies, and own relationships with project developers and commercial financial institutions. May also oversee (or represent government stake in) energy regulators, state-owned utilities, and transmission and distribution networks. Also responsible for energy access and security.
- **Ministries of planning and international cooperation:** typically responsible for donor co-ordination, including ensuring co-ordinated requests from the government for donor finance, as well minimising duplication of donor efforts.
- **Ministries of finance:** responsible for fiscal policy, including decisions on public capital expenditure for infrastructure projects, as well as tax and subsidy regimes that can impact energy markets. May also be responsible for financial regulation and the development of green taxonomies, alongside central banks and financial regulators, which can affect commercial financing of infrastructure projects and wider local capital market development.
- **Ministries of transport**: responsible for transport decarbonisation strategies, including zero emission vehicles roll-out and wider infrastructure (roads and charging infrastructure).
- **Ministries of economy and industry:** often integrated with finance ministries; responsible for economic development, including industrial strategies, with a significant interest in energy supply and cost.
- **National development banks and sovereign wealth funds:** responsible for the strategic deployment of public finance to support infrastructure projects and other development priorities, with varying degrees of experience and success of working with the private sector.

The range of actors and responsibilities across different government ministries and agencies will vary across countries. In many countries, local and regional governments will have significant devolved competence for the issues listed above. Irrespective of the exact distribution of responsibilities, close co-ordination, including through the development of a government-wide strategy, is essential for the successful delivery of energy decarbonisation plans.

As part of this, comprehensive financing strategies are critical. Decisions on where best to deploy scarce domestic and international public finance can be best optimised with reference to governments' various policy and infrastructure investment priorities. As well as giving donors and commercial investors a clear sense of a government's priorities, robust co-ordination and governance, that includes donors and the private sector, can help to more effectively draw on international (public and private) finance by providing governments with a holistic view on what is available and what steps or policies are needed to mobilise it.

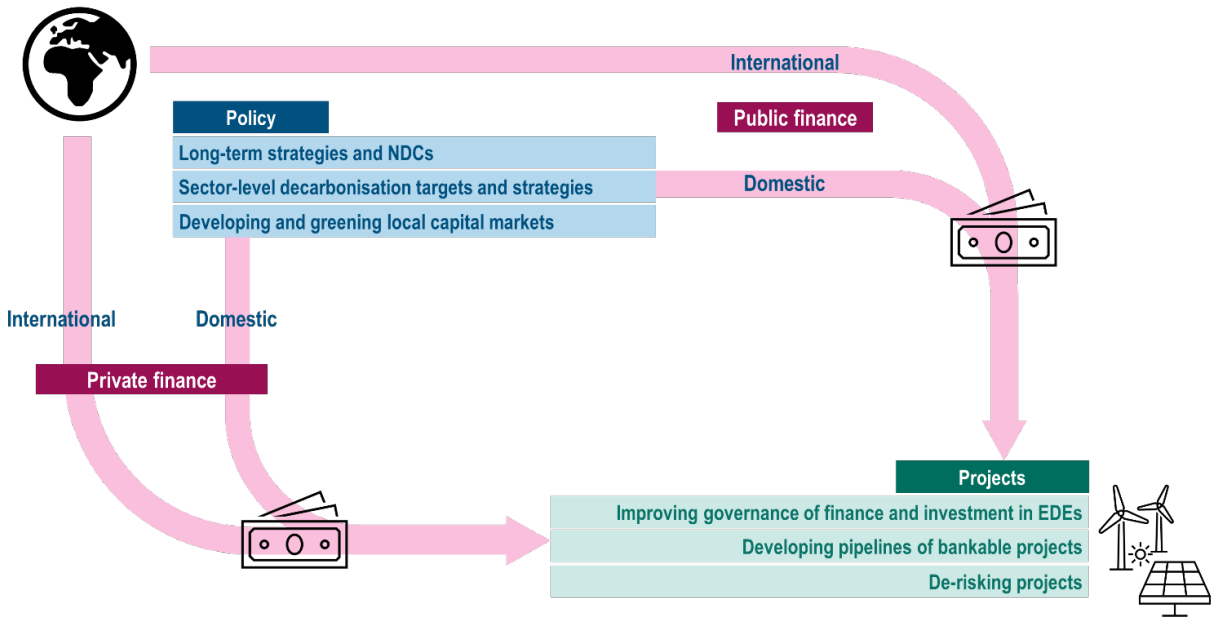
Practically, and at a minimum, effective external co-ordination should include the following elements (represented in Figure 1.6 below):

- Defined, robust, and specific energy sector decarbonisation and clean development strategies, with time-bound targets (for example GW renewables capacity by 2030; phase-out dates for internal combustion engines; new building efficiency regulations).
- Capitalising on donor expertise and technical assistance to support development of sector strategies, supporting the development of standardised documentation (for example for power purchase agreements and energy performance contracts) to facilitate replication and project preparation to develop pipelines of bankable projects at scale.
- Working with bilateral donors, local financial institutions, and commercial finance alliances (for example the *Glasgow Financial Alliance for Net Zero)* to develop sectoral financing strategies that identify which projects require public finance, identify potential sources of public and private

international finance, and subsequently to develop local capital market solutions to support these ends.

- Drawing on private sector experiences and expertise to identify market failures, risks, and barriers to investment, at the country, sector, and project levels; and agree shared strategies to address them.
- Drawing on donor support and international commercial financial institutions' expertise to support the deepening of local capital markets through short-term project-specific partnerships with local financial institutions and longer-term policy support, capacity building and partnerships towards capital markets development.
- Robust governance to facilitate strong senior and working relationships between the various parties at both the strategic and project levels; update and consult partners on wider policy reforms; steer delivery; work through tensions and blockages; and monitor and report progress.

Figure 1.6. The clean energy policy and investment ecosystem



Source: Authors

Such co-ordination can help governments, donors, and the private sector identify barriers to investment and solutions to overcoming them in a holistic way. This can help ensure that public finance strategies, including any decisions to deploy blended finance, are taken as part of a more comprehensive process of improving enabling environments, for example through wider reform efforts. Critically, strong co-ordination among all interested stakeholders can ensure that the deployment of development finance generally, and blended finance specifically, is targeted, optimised, and preserved for where it is most needed: to where it can have the highest development impact. It can also facilitate the transfer of knowledge and expertise from the private to the public sector, supporting the development of local capital markets and the wider investment and infrastructure ecosystem.

A number of multilateral and private sector-led initiatives exist to this end, most prominently the G7's Just Energy Transition Partnerships (see Box 1.1 below). These provide a strong foundation on which to deepen and broaden the cooperation required to effectively deploy development finance in general, and blended finance in particular.

Box 1.1. Spotlight: Just Energy Transition Partnership, South Africa

At the 2021 United Nations Climate Change Conference (COP26), the governments of South Africa, France, Germany, the United Kingdom, the United States of America, and the European Union announced a long-term Just Energy Transition Partnership (JETP) to support the Republic of South Africa's decarbonisation efforts, with a focus on the clean energy transition. The JETP's priorities – underpinned by a financing pledge of USD 8.5 billion over 3-5 years – include accelerating South Africa's electricity sector decarbonisation, protecting vulnerable workers and communities affected by the transition away from fossil fuels, supporting the reform process essential to strengthening the enabling environment for the just transition, and supporting opportunities for technical innovation and public and private investment.

The JETP established an International Partners Group (IPG), formed of representatives of its member governments, to co-ordinate amongst its members and with the South African government. The IPG also co-ordinates with multilateral development banks and development finance institutions, who are key to the delivery of the JETP. The JETP is supported by a secretariat, currently resourced and supported by the Climate Investment Fund. The JETP will establish five working groups through which technical expertise and experience can be mobilised to support its objectives.

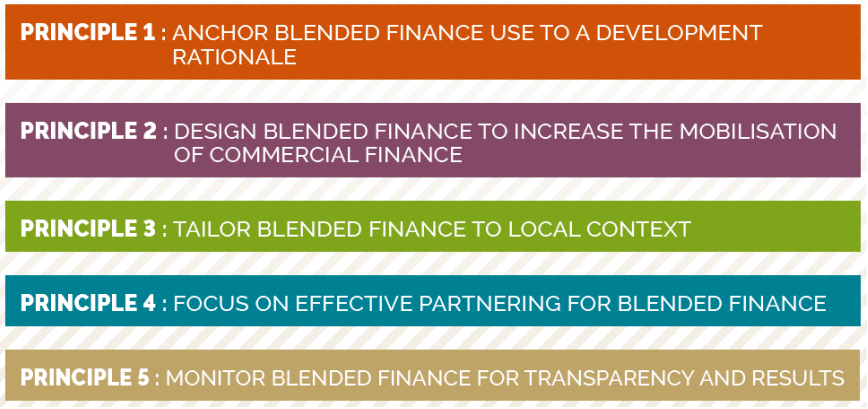
The JETP's extensive substantive programme and governance structure to support it provides a strong vehicle through which to make international support more coherent and predictable. Though the private sector is not formally represented in the JETP, its clearly-defined medium priorities can help give the market a clear signal on the strong domestic and international commitment to South Africa's energy transition.

Source: (UNFCCC COP26 Presidency, 2022[12]), *Six-month update on progress in advancing the Just Energy Transition Partnership (JETP),* https://ukcop26.org/six-month-update-on-progress-in-advancing-the-just-energy-transition-partnership-jetp/.

2 Revisiting the OECD DAC blended finance principles for clean energy

Blended finance is the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries. Additional finance is commercial finance that does not have an explicit development purpose and that has not primarily targeted development outcomes in developing countries, and development finance is public and private finance that is being deployed with a development mandate. This framing of blended finance distinguishes finance by purpose rather than by source, moving away from the emphasis on public/private actors to highlight development/commercial finance flows. It is broader than those used by multilateral development banks (MDBs) and development finance institutions (DFIs) in that it does not depend on concessionality as a pre-requisite for blending and considers blending in the context of both public and private investments. Blended finance occurs within the context of a specific transaction and differs from public support for policy and regulatory reform which also has a role in unlocking commercial capital in developing countries (OECD, 2018[13]).[3] The OECD's Blended Finance Principles offer a common policy framework to guide the use of blended finance. These principles are designed to offer general lessons that apply for all sectors and development priorities, and are a strong foundation on which to develop both further theory on best practice and practical lessons for real-world application in the clean energy sector.

Figure 2.1. The OECD DAC Blended Finance Principles



Source: (OECD, 2018[13]), *OECD DAC Blended Finance Principles for Unlocking Commercial Finance for the Sustainable Development Goals*

[3] The OECD definition of blended finance does not include "indirect mobilisation", defined by the multilateral development banks as "combining concessional finance from donors or third parties alongside DFIs' normal own account finance and/or commercial finance from others to develop private sector markets, address the Sustainable Development Goals (SDGs), and mobilise private resources" (AfDB, AsDB, AIIB, et al., 2017[35]).

Scaling the mobilisation of commercial capital towards clean energy will require concerted, systematic efforts by beneficiary governments, donors and the private sector. Having a clear overarching development, and by extension, climate objective – for example sustainable energy access and clean industrial development – as per Principle 1, can help manage commercial investors' perceptions of risk by giving them confidence that individual projects and investments are part of a wider, determined government strategy. Projects, and the way in which they are financed, also need to be determined in large part by local conditions, in line with Principle 3 – for example by being tailored to local capital market conditions – in order to most effectively tap into commercial capital and help address potential foreign exchange issues most effectively. Establishing strong partnerships and country-led governance structures that bring together beneficiary governments, donors and the private sector, in line with Principle 4, can also help to align the incentives of commercial investors with beneficiary countries' wider development and climate objectives. Finally, the complexity of blended finance is often compounded in the case of the clean energy sector, one feature of which is the presence of untested project developers, technologies and routes to commercial sustainability; this puts an additional emphasis on the need for effective monitoring and evaluation of results, in line with Principle 5.

Whilst blended finance can be an effective mechanism for scaling the mobilisation of commercial finance, it is not a panacea. It cannot alone address long-standing barriers to infrastructure investment in emerging and developing economies and must come as part of a wider strategy to address macro-level – for example, sovereign credit risk and other macroeconomic imbalances, currency instability, and weak local capital markets – as well as sector-specific barriers to commercial investment. Blended finance should be deployed in a way that supports the creation of sustainable private markets and be provided together with support to strengthen and create suitable regulatory frameworks that can attract commercial finance and private investments in clean energy projects. Moreover, blended finance may not always be the solution to scaling up the mobilisation of commercial finance and given the scarcity of development finance and wider development and climate objectives, its use should be carefully calibrated to maximise its impact.

The types of blended finance – including the instruments and levels of concessionality, if any, that may be required – should also be carefully tailored to the context in which it is being used. These features will be discussed in the subsequent sections. One of the key determinants for deciding the most appropriate types of blended finance will be the underlying risks and barriers to commercial investment that it is trying to address. Clean energy sector-specific features and barriers to commercial investment include:[4]

- **Political risk:** clean energy projects that are highly site-specific – for example wind, hydro-electric, and solar plants – can be subject to politically and socially sensitive and complex land permitting processes. As well as increasing the risk that projects fail to get approval, this can prolong the development phase of projects and delay construction and operation, and therefore the point at which investors begin generating returns.
- **Currency risk:** exchange rate volatility can create mismatches between obligations priced in US dollars and revenues denominated in local currency, a common feature of power purchase agreements for utility-scale renewable power generation projects in emerging and developing economies (EDEs).
- **Revenue volatility**: the rapid growth and relative inexperience of stakeholders along the clean energy supply chain can result in inaccurate assessments of, and imbalances between, supply and demand. This can be compounded by the long-time horizon of clean energy investments.

[4] General barriers and risks facing infrastructure investment – including political risk, policy and regulatory risk, currency risk, construction risk, and operation risk – are well-researched and documented. This section, and the wider paper, will not revisit them unless there are specific additional considerations for clean energy investment.

- **Untested track records** of specific technologies, project developers and operators create both a higher perception of risk and make it more difficult for investors to undertake robust due diligence on potential investments.
- **Counterparty, off-taker and transmission line delay risk,** in the form of weak creditworthiness of local partners, such as power utilities, as well as due to the dependence of many clean energy projects on parallel infrastructure investment (for example the dependence of renewable power generation projects on grid infrastructure that is completed in time for energy production).
- **Reputational risk** surrounding sourcing of raw materials and manufacturing of components for clean energy infrastructure, as well as overall sustainability of infrastructure, for example in management and recycling of batteries for storage.

The following sections will revisit the sub-principles under OECD DAC Blended Finance Principle 2: designing blended finance to increase the mobilisation of commercial finance, overlaying clean energy sector-specific considerations. It aims to support policymakers, project developers and financiers to better judge how and where best to use blended finance, including exploring its use in various clean energy sub-sectors, and which specific sectoral and geographic features should be considered when deciding on the deployment of specific instruments and degrees of concessionality.

Sub-principle 2.A: Ensure additionality for crowding in commercial finance

Additionality of development finance is defined as providing additional financial or non-financial input resulting in additional development outcomes that would not have materialised without the intervention, thereby contributing to amplified development impact (OECD, 2020[14]). The practical implications of adherence to this principle are therefore that:

1. blended finance should be deployed only for uses where commercial financing is not currently available for development outcomes, especially if it involves concessionality; and
2. blended finance should have an explicit focus on opportunities to crowd in financing from commercial sources into transactions that deliver development impact (OECD, 2020[14]).

Additionality is particularly pertinent to clean energy, which attracts a large portion of commercial investment relative to other sectors (OECD, 2021[15]). Given the significant financing needs of wider climate action, including investment in adaptation and resilience, as well as in wider development objectives, it is critical that scarce public and concessional finance is preserved for the interventions where it can have the greatest additional impact. Nevertheless, absolute development finance flows both to blended finance interventions in general, and towards clean energy in particular, remain low and need to be significantly scaled up in order to close the global clean energy financing gap.

The two components of additionality, which will be explored in turn with reference to their application to clean energy, are:

- **Financial additionality:** transactions extended to an entity which cannot obtain finance from the private capital markets (local or international) with similar terms or quantities and for similar developmental purposes without official support, or if it mobilises investment from the private sector that would not have otherwise invested.
- **Development additionality**: the development impact of the investment that would not have occurred without a partnership between the official and the private sector (OECD, 2020[14]), for example increasing job-creation, access to finance for women-owned businesses, increasing CO_2-reduction through scaled up financing for new technologies, or increasing resilience through insurance solutions for small-scale farmers.

In addition to the direct financial and development additionality of projects, blended finance interventions may also have the indirect development benefit of accelerating the implementation of policy reforms that are required to unlock commercial capital, further stimulating private capital mobilisation and private sector development beyond the project in question.

Assessing additionality is difficult, since it requires assessment of a counterfactual of commercial mobilisation and development impact that is dependent on a multitude of factors. The MDBs' *Harmonized Framework for Additionality in Private Sector Operations* provides a useful set of indicators against which additionality can be measured for development finance (Multilateral Development Banks, 2018[16]). As a general principle, robust ex ante assessment of specific project features can support judgements on whether commercial investment would have been forthcoming without blending of development finance, and on whether blended finance is capable of delivering additional development outcomes over those delivered purely by the amount of development finance used for blending (OECD, 2020[14]). This section explores particular features of clean energy projects that may inform assessments of financial and development additionality.

Assessing financial additionality for clean energy

Commercial investment decisions are guided by a plethora of factors that influence real or perceived risk and expected returns. Despite the falling costs of many clean energy technologies (IRENA, 2021[17]) (IEA, 2020[18]), this calculus for commercial investors is often unfavourable, due to a number of general, long-standing barriers and risks to investment in EDEs, as well as clean energy sector-specific risks. Moreover, commercial financial institutions' business models – including a preference for more liquid assets and limited institutional capacity to invest directly in projects among institutional investors – as well as regulatory requirements increasing the cost of capital for longer term investments, further constrain commercial investment in clean energy (Climate Policy Initiative, 2018[19]).

Blended finance can be used to de-risk investments and mobilise additional commercial finance. This requires a comprehensive assessment of the underlying risks that deter commercial investment, in order that blended finance is targeted and adjusted to the specific risks facing a particular potential investment, whilst concessionality is minimised. Blended finance interventions should also be combined with parallel efforts to tackle both structural and sector-specific barriers to infrastructure investment in order to support long-term mobilisation of commercial capital, as well as to ensure long-term commercial sustainability for individual projects (see sub-principle 2.D below).

The potential for financial additionality in clean energy will vary by technology and geography, reflecting project- and country-specific risks, barriers and opportunities. The energy transition will also require carefully planned and managed retirement of incumbent technologies, including the phasing out of coal-fired power. In many contexts this shift will have significant labour market, social and wider distributional impacts (see Box 2.1 on Energy Transition Mechanism). Public support, including blended finance, can help accelerate and smooth these transitions, support for which needs to be considered alongside support for clean energy investment. Notwithstanding these links, the scope of this paper is limited to blended finance for clean energy technologies. While this list is not exhaustive, the following clean energy sub-sectors display some common characteristics.

- **Off-grid clean energy systems**: Distributed renewables and mini-grid solutions often face the problem of being too small to attract the attention of commercial investors. The relative cost of conducting due diligence on projects, relative to the expected returns, is much higher for investors. However, given distributed renewables and mini-grid solutions are often designed to provide energy access to the most under-served communities, the development and financial additionality of such projects is potentially very high. Moreover, the relatively simple nature of projects, reduced dependence on wider grid infrastructure and speed at which they can be deployed provide certain advantages, including for a more diversified portfolio that can reduce risks compared to utility scale

renewable investments. Blended finance can be used to support aggregation of small projects into larger financial products that are more attractive to commercial investors.

- **Energy efficiency:** Commercial financing of energy efficiency faces a number of barriers: firstly, investment in efficiency is often undertaken by individuals or small and medium-sized enterprises (SMEs), whose access to finance is often constrained; secondly, it does not yield direct revenue, but incremental savings over time; and linked to the previous point, there is a lack of financial instruments designed specifically to fund investments in efficiency, in part due to the small size of investments. Blended finance can address these barriers to investment and unlock additional commercial finance by supporting the aggregation of small loans towards efficiency investments into larger products, supporting local financial institutions to access refinancing through green bonds, through the financing of preferential mortgages for more efficient buildings, and by demonstrating new business models such as energy service companies (ESCOs). Policy support to strengthen regulatory environments needs to complement any deployment of blended finance, for example through wider and more stringent minimum energy performance standards.
- **Utility scale renewables:** Large renewable projects often face similar risks to other large infrastructure projects: long planning phases surrounded by political uncertainty; long construction phases, delaying the onset of revenues; and payment structures that are sensitive to macroeconomic and currency fluctuations. Off-taker risk, through dependence on single purchasers of power in the form of state-owned power utilities, often with poor financial performance, can also increase the cost of capital. Dependence on governments to connect transmission lines to new generation infrastructure can add a further layer of uncertainty. Even in more mature markets, mobilising commercial capital can be constrained due to limited headroom among financial institutions to extend capital to large projects, and shallow local currency debt markets. These risks and barriers to investment are multifaceted, complex and interconnected. The use of blended finance therefore needs to be part of a wider, concerted strategy to address the various, interconnected risks to commercial investment. In addition, blended finance needs to be tailored to address specific risks. For example, political risk insurance to mitigate uncertainty around the project development phase; performance insurance and partial risk guarantees can help address revenue risk; and guarantees can cover non-payment due to delays of parallel transmission infrastructure.[5]
- **Other clean energy and integration:** A number of other clean energy and integration technologies will also need to be developed and commercialised to achieve a net zero transition across the entire energy system. This includes large scale energy storage to facilitate higher levels of variable renewable generation such as wind and solar, as well as green hydrogen and CCUS. Nuclear power will also be part of the clean energy mix in some countries, but given very high capital costs, concerns related to the safe development of nuclear, and the dependence on public finance for development, for the purposes of this guidance nuclear has not been considered. Blended finance can be used to support the early market development of large-scale storage, CCUS and green hydrogen. Its use in the development of new technologies should focus on de-risking near commercial deployment at more mature stages of the value chain, rather than taking on technology risk. For example, batteries and electrolysers are proven technologies but need help to scale and enter new markets or used in wider applications.

[5] See (Garbacz W., 2021[37]), *The role of guarantees in blended finance*.

Box 2.1. Spotlight: Energy Transition Mechanism

The governments of Indonesia, the Philippines, and Viet Nam and the Asian Development Bank (ADB) launched the Energy Transition Mechanism (ETM) at COP26. The ETM was established to finance funds to purchase thermal coal power stations and bring forward their retirement and replacement with renewables. The ETM aims to reduce coal generation capacity in its three pilot countries by 50%.

The ETM is comprised of two funds:

- a Carbon Reduction fund to provide a blended finance mechanism to accelerate the retirement of coal assets by lowering the cost of capital and reducing the operating life of coal assets
- a Clean Energy fund to invest in renewable power to replace retired fossil generation assets.

The ETM will leverage the ADB's convening power and technical expertise to support delivery of its objectives, including through engagement with the private sector.

Source: (ADB, 2021[20]), *Energy Transition Mechanism*, www.adb.org/what-we-do/energy-transition-mechanism-etm#:~:text=What%20is%20ETM%3F,fossil%20fuels%20to%20clean%20energy.

Assessing development additionality for clean energy

Blended finance that catalyses the mobilisation of private capital has a number of positive general development impacts: it can help establish a track record of private investment that galvanises future investment and it deepens local capital markets, with spill-overs for the wider business and investment environment, including by enhancing access to finance for SMEs, women and disadvantaged groups.

The development additionality of clean energy includes several facets:

- **Decarbonisation**: Achieving emissions reduction of energy production and use is increasingly a central objective of EDEs seeking to align their development pathways with the goals of the Paris Agreement. As well as the direct climate impact, decarbonisation can help improve local air quality and health outcomes. Financial solutions to accelerate the retirement of coal-fired capacity and support renewable electricity generation and other low carbon alternatives will be essential.
- **Energy access and security:** Rapid investment in clean energy will be required to meet existing and future energy demand of households and expanding access to affordable and clean energy services, itself a major development outcome. Clean energy is cheaper and subject to less price volatility than conventional sources of energy. Off-grid solutions can also be used to provide energy access to underserved communities, for example in remote geographies. At the macro level, reducing reliance on imports of fossil fuels can improve the trade balance, and reduce exposure to swings in international market prices.
- **Industrial development and efficiency:** Investment in clean energy can be combined with long-term industrial strategies to provide cheap and stable energy to domestic firms. Together with investment in efficiency, these can reduce long-term costs for businesses and improve competitiveness. Countries with high potential for renewables can also pursue strategies to develop clean energy for export.

These development outcomes do not themselves necessarily justify the use of blended finance for clean energy. It may be possible, for example, to achieve desired development objectives through purely public investment, though in these cases the opportunity cost of foregone spending on other development priorities should be considered; for EMEs with significant development and wider climate needs, this opportunity cost is high. Conversely, development finance should only be used to catalyse commercial finance through blended finance structures if there is a plausible degree of certainty that private investment

is required and is not forthcoming on its own. This will become more important as the costs of clean energy continue to fall in the coming years and the case for the use of concessional development finance to galvanise private investment becomes harder to justify. These assessments, however, need to be made with reference to specific project, sector, market and country features.

Box 2.2. Spotlight: Energy and SDG 5 – Gender Equality and Women's Economic Empowerment

As a recent OECD paper highlights, blended finance funds and facilities have the power to mobilise more financial resources for cross-cutting social and environmental imperatives, such as climate-related investments including clean energy, gender quality and women's economic empowerment, and decent work. With strategies designed to target the Sustainable Development Goals (SDGs) in a holistic manner, these vehicles can complement official flows and address current funding shortages.

The 2020 edition of the *OECD Blended Finance Funds and Facilities Survey* gathered primary data on the extent to which vehicles focused on gender equality. Specifically, in line with the methodology of the *OECD DAC Gender Equality Policy Marker* (OECD, 2016[21]), survey respondents answered whether their fund or facility was dedicated to gender equality, integrated (mainstreamed) gender equality, or did not identify gender equality as an objective (OECD, 2022[22]).

Analysis found that, while vehicles that mainstream gender equality span many sectors, a large number concentrate on energy (29%, representing USD 8.8 billion) (OECD, 2022[22]). A prime example is the Norwegian Investment Fund, which includes gender equality in its investment strategy in several clean energy projects across sub-Saharan Africa. Elsewhere, the Clean Energy Financing Partnership Facility (CEFPF) has set its overarching target as an increase in the use of clean energy. Within this, the CEFPF also reports gender-related output indicators, including the cumulative increase in access to energy (CEFPF, 2020[23]).

Ultimately, there are promising opportunities to forge stronger links between sectors like clean energy and gender equality.

Sub-principle 2.B: Seek leverage based on context and conditions

In the context of blended finance, leverage refers to the amount of commercial finance mobilised for development objectives. The OECD defines leverage as having exposure to the full benefits arising from holding a position in a financial asset, without having to fully fund the position with own funds (OECD, 2008[24]). Mobilisation refers to the ways in which specific mechanisms stimulate the allocation of additional financial resources to particular objectives ("direct mobilisation"). Though the OECD's definition of mobilisation does not include indirect mobilisation,[6] it is an important complement to efforts to directly mobilise capital in the context of significant, long-term financing needs across a range of sectors.

At the global level, maximising leverage will be critical to closing the global clean energy financing gap and meeting a Paris-aligned transition pathway. However, the potential to tap into commercial finance will vary markedly across different geographies, depending on a particular jurisdiction's country, regulatory, market, technical, financial and foreign currency risks, among others, as well as on the strengths of macroeconomic fundamentals, the investment climate, local capital markets and sector frameworks (OECD, 2020[14]).

[6] Indirect mobilisation is defined by the multilateral development banks as "combining concessional finance from donors or third parties alongside DFIs' normal own account finance and/or commercial finance from others to develop private sector markets, address the Sustainable Development Goals (SDGs), and mobilise private resources" (AfDB, AsDB, AIIB, et al., 2017[11]).

Many of the factors that determine financial additionality can be used to assess the mobilisation potential of blended finance. Riskier investments, or those perceived to be riskier, are likely to have lower potential to mobilise commercial finance. Consequently, projects in less risky jurisdictions tend to achieve the highest leverage ratios; but given lower risk is associated with higher levels of overall economic development, the additionality of blended finance is lower, reflecting an inverse relationship between additionality and mobilisation (OECD, 2020[14]).[7] These factors present additional barriers to investment for clean energy, particularly in EDEs, given the scale, pace and complexity of clean energy investments that will need to be funded in the coming decades. This section assesses the implications of varied local conditions for clean energy investment and the implications for blended finance.

Geography

Country risk, including sovereign credit ratings, are a major driver of cross-border investment decisions. Sovereign credit ratings in most low and low-middle income countries are non-investment/speculative grade. Meanwhile, rising debt levels in EDEs, exacerbated by the Covid-19 pandemic, present further macroeconomic pressures with implications for both public and private investment. Currency risk also takes a particular complexion in the case of clean energy, as discussed in the preceding section. These pressures, together with underdeveloped local capital markets, serve to keep the cost of borrowing and capital high in EDEs, which the IEA estimates to be on average seven times higher than in the US (IEA, 2021[1]).

Clean energy investments in EDEs are reliant to a greater extent on equity than debt in EDEs as compared to advanced economies (see Figure 1.5 in Section 1). This imbalance will need to be corrected, and debt much more effectively mobilised. Weak macroeconomic and investment climates, and shallow local capital markets, which increase the cost of borrowing, are therefore a major impediment to commercially financed clean energy investment. Specific blended finance instruments, for example, on-lending facilities can reduce the cost of borrowing for distributed power generation and SME investments in energy efficiency (IRENA, 2016[25]), thereby supporting the mobilisation of commercial finance. Developing local capital markets will also be critical, both to mobilise domestic commercial finance more effectively, and because domestic financial institutions are often better suited to take on local policy risks (perceptions of which can be overstated by international private financial institutions).

Local institutional arrangements and appropriate governance structures will also be key to ensuring that blended finance can also leverage domestic commercial finance institutions. Blended finance facilities can support the development of local capital markets for financing of renewable energy and energy efficiency projects by helping to develop local financial expertise and experience in financing such projects, consequently helping to reduce perceived risks and improve deal flow. Establishing suitable local partnerships (in line with OECD DAC Blended Finance Principle 4) for the co-development of financial instruments with local financial institutions can also accelerate the development of financing solutions that are more adapted to local circumstances, draw on existing banking relationships and access a large pool of project developers (OECD, 2020[26]).

Financial regulation, specifically Basel III and Solvency II, can have the unintended consequences of deterring investment in illiquid assets, and discouraging long-term lending to renewable energy projects. Loan tenor extensions and subordinated debt can help address these pressures, by transferring risks from local financial institutions to MDBs and DFIs that are buttressed by stronger credit ratings, and who are better placed to assess and manage risk, drawing on deeper experience of managing clean energy projects. DFIs can operate in local currency and when necessary, hedge currency exposure in order to

[7] The sector-level analysis in Chapter 3 will explore factors that could be taken into account to support assessments of potential development impact and commercial viability of projects to support determinations of the degree of appropriate support from development finance.

operate, and can carry out transactions in euros or dollars when technologies need to be sourced internationally.

The single buyer model of many electricity systems in EDEs can also create barriers linked to financial regulation that limits bank exposure to single entities as a way to mitigate financial risks. Many domestic banks are often deeply exposed to debt holdings of state-owned utilities, which are often also the single buyers of power. This limits the potential to provide commercial finance to renewable power projects that hold power purchase agreements with utilities. Exposure to a small banking sector for a sizeable project may also mean that finance needs to be sourced from a number of financial institutions. Prudential sectoral exposure limits also constrain the flow of capital from banks, necessitating the development of local debt capital markets to recycle existing primary debt and expand the overall flow of capital.

Physical project features can also present challenges for commercial finance. Smaller projects in remote areas, for example distributed solar power generation in rural communities are often too small to attract the interest of institutional investors and concerns around the creditworthiness of residential or business owners create additional barriers. In addition, and as discussed in the preceding section, large commercial financial institutions often lack the capacity or expertise to conduct due diligence on smaller projects. Blended finance to support project aggregation and securitisation can help address these barriers, by pooling assets into much larger, more attractive, and rateable assets, while credit guarantees can help to overcome concerns of creditworthiness.

Stage in the project cycle

The availability and potential for the mobilisation of commercial finance will vary across the project cycle. Early-stage projects in the development phase are deemed higher risk and are further away from generating revenues. Given the novelty of clean energy projects in EDEs, as well as the entrenched positions of fossil fuel energy providers, there can be a higher degree of uncertainty surrounding early-stage clean energy projects. This puts a greater emphasis on equity financing, compounded by the aforementioned constraints in the form of higher cost of capital. Government stakes in early-stage clean energy projects, as well as grants to de-risk investments, and technical assistance towards project development, can help make early projects more attractive for commercial investors.

Though the risk of default is typically smaller in the construction than in the development phase in EDEs, there may be a heightened risk of cost overruns for clean energy projects, particularly where project developers are less experienced or administrative procedures for land access and permitting is overly cumbersome. Nevertheless, it is generally easier to attract debt financing during the construction phase, as a degree of uncertainty surrounding when a project will break ground is reduced. Blended finance instruments for projects closer to completion and revenue generation should also be more attractive to commercial investors, thereby reducing the required concessionality to crowd-in commercial finance.

Finally, in the operation phase, governments, donors and project developers should assess options for reducing concessionality, and act on ex ante plans for long-term commercial sustainability. Wider clean energy investment, climate, development needs and the opportunities for further investment will continue to be significant. Early-stage developers and public sector equity holders with higher risk appetites should therefore actively seek to bring in late-stage investors whose risk appetites limit their interest to projects where cash-flow has been proven and exit projects to free up capital for riskier investments elsewhere.

Sub-principle 2.C: Deploy blended finance to address market failures, while minimising the use of concessionality

The use of concessionality is motivated by the presence of imperfect markets that do not allocate commercial finance to development outcomes. A range of market failures exist in the clean energy sector

that present barriers to achieving clean energy transition objectives and can be particularly challenging to overcome in emerging and developing economies where regulatory frameworks for clean energy development may be lacking.

The mobilisation of commercial finance is at the core of any blended finance intervention and the use of concessional finance needs to be carefully evaluated to ensure that it does not lead to distortions in the market. The supply of bankable or near-bankable clean energy projects in some emerging and developing economies is limited, and the demand to finance climate aligned projects outstrips supply, in some cases to a degree where development finance may be in direct competition with commercial finance.

Market failures

Public goods: Access to affordable and modern clean energy services are central to meeting sustainable development goals. In emerging and developing economies, 759 million people are still without access to electricity and 2.6 billion people lack access to clean cooking (SEforALL, 2022[27]). The cost of providing clean electricity to all users can exceed the ability of consumers to pay the full cost of electricity provision creating a public good dimension to providing clean power supply to all consumers. The rapid decline of solar photovoltaic (PV) costs has helped to increase electricity access in many emerging economies such as India and Cambodia, but many least developed countries and small island developing states still struggle to expand clean electricity supply. Improving energy access can be particularly beneficial to improving opportunities and development outcomes for women and girls. Access to clean cooking continues to lag behind despite the much smaller investment volumes needed to provide universal access to clean cooking.

Externalities: The lack of adequate carbon pricing at the levels that internalise the full environmental and energy security costs of fossil fuel usage results in the market inadequately providing clean energy services. Fluctuations in fossil fuel prices also creates uncertainty on the economics of clean energy and highlight the potential economic benefits of a more rapid switch towards renewables, energy efficiency adoption and other low carbon energy sources. While carbon pricing is gaining momentum around the world, current carbon prices (typically below USD 5 / tCO_2) in emerging and developing economies are too low to send adequate market signals that will shift countries away from fossil fuels. Full decarbonisation of the energy supply and end use sectors would require carbon prices in the range of USD 50 / tCO_2 by 2030 rising to upwards of USD 150-200 / tCO_2 to achieve full decarbonisation across all end use sectors.

Fossil fuel subsidies continue to create market distortions in the use of fossil fuels and reduce the attractiveness of renewable energy and energy efficiency investments. These inefficient subsidies typically lead to wasteful usage of fossil fuels and create major barriers to the adoption of energy efficiency technologies and conservation as consumers do not have adequate price signals to change behaviour. Moreover, many beneficiaries of these subsidies are in higher income classes that no longer require public support. In some cases fossil fuel subsidies are designed to support industrial development, potentially leading to market distortions and creating disincentives to investment in the most efficient equipment and processes. Finally, the prevalence of fossil fuel subsidies in emerging and developing economies locks in carbon intensive infrastructure, reducing the competitiveness of clean energy alternatives. The reduction and removal of fossil fuel subsidies should therefore be considered alongside any deployment of blended finance that aims to support clean energy investment; however, technical assistance, rather than blended finance, is a more appropriate mechanism through which to support fossil fuel subsidy reform.

Information asymmetries in the clean energy sector create significant barriers to market development. In the renewable electricity market, feed in tariffs (FiTs) have created boom and bust cycles in developed, emerging and developing economies as governments struggle to establish FiTs that are adequately attractive to stimulate the market without over subsidising developers. The rapid cost declines of solar and wind technologies that accompany rising deployment have proven difficult to anticipate. The performance of energy efficient equipment is impacted by operational know-how and local climate and resource aspects

as well as consumer behaviour that can lead to differences between actual and expected performance. Performance of new technologies in new markets also suffer from inadequate data for financial institutions to performance risk assessments and resource data (i.e. hydrological data for hydro power plants) provided by developers in feasibility studies may differ from actual performance. The lack of reliable and transparent clean energy data can hinder market development and lead to higher financing costs or absence of commercial finance.

Market inefficiencies

Catalysing clean energy markets: access to commercial finance for clean energy technologies that have yet been proven in the market can be challenging. Financial institutions often lack the internal knowhow and experience to undertake project due diligence and adequately price risk. The lack of performance data creates high perceived risks and as a result the level of concessionality that may be needed to attract adequate capital to realise the first projects and establish the market. As experience grows the need for concessionality declines and access to commercial finance rises. Syndication, or managed co-lending, can facilitated by DFIs to allow risk sharing among debt providers in frontier markets.

Access to affordable modern energy services may require the use of concessional funding to lower costs. Blended finance can be used to help demonstrate new business models and establish markets, but longer-term sustainability will need to include structural reforms and targeted safety nets. Programmes targeting energy access should also consider regional economic development that can in the future provide adequate income to pay for energy services. For example, a focus on solar irrigation systems for farmers can support income creation that can finance investments in both energy and water supply to communities.

Achieving project bankability: in addition to lowering the cost of finance through concessionality, blended finance can help to strengthen the feasibility of clean energy projects by providing finance for project preparation. Such funds should focus on opportunities to replicate transactions in the market to crowd in more commercial finance and build capacity and knowledge of local developers that can help grow the clean energy market and provide jobs. Focusing limited technical assistance in clean energy markets with high local employment potential would also support development additionality.

Drivers of concessionality in the clean energy sector

The choice of financial instrument should reflect the level of concessionality required to support commercialisation and uptake of a given clean energy technology. Detailed market assessment of the key barriers and risks can help to better determine the right financial instruments and level of concessionality required. Grants for project preparation and structuring may be more suitable than concessional debt in cases where there is already good experience of financing a given clean energy technology, while concessional finance may be more suitable in cases where a new technology has yet to be established in a particular market. This sub-section will explore factors that can be taken into account when assessing the required level of concessionality of blended finance.

Sector and geography: the need for concessional finance in the clean energy sector will depend on the country context and clean energy sub-sector. In countries with strong regulatory environments with well-functioning power and energy markets as well as developed financial markets, commercial finance, particularly for utility scale renewable energy projects, is often readily available. However, many smaller-scale clean energy projects, such as distributed renewables and energy efficiency projects, can struggle to access affordable finance. These projects are often developed by smaller, less established developers, who require a degree of concessionality in order to access commercial financial markets.

In the case of energy efficiency projects developed by energy service companies (ESCOs), the energy savings approach to financing investments in energy efficiency is not well understood by banks who typically look at revenue generated cash flows to evaluate the capacity for developers to repay project

loans. The ownership structure of the energy savings equipment can also create obstacles to finance as this may not lie with the ESCO, leading to collateral issues. The provision of energy services such as heating, lighting, refrigeration, cooling or renewable power through ESCOs are in many countries still a relatively new business model and the lack of experience and suitable comparative performance data can limit availability of commercial finance.

Certain market segments may require the use of concessional finance to develop business models that can crowd in private investors to provide access to modern energy services (clean cooking, water heating) and/or most efficient technologies (for example, LED lighting). The high capital cost of many clean energy technologies versus fossil fuel technologies, traditional biomass (typically free or low cost) or less efficient equipment (incandescent light bulbs) can make these options even less affordable if financing costs for the purchase of equipment is also prohibitively high. The use of concessional finance can improve affordability and help to drive down future costs as deployment increases and financial institutions gain experience in financing energy access projects.

Project cycle and market maturity: Early-stage development capital for certain clean energy technologies, such as geothermal where exploration costs are high and can be extremely risky may require higher levels of concessionality than less risky technologies such as solar and on-shore wind, where resource data is more established. Market maturity also influences availability and cost of commercial finance, as less mature markets will face significant information asymmetries and lack reliable performance data to which financial institutions can adequately evaluate project risks. Lack of experience also drives concerns around perceived risks. While solar PV and onshore wind technologies are often considered mature, in some emerging and developing economies where fossil fuel technologies continue to dominate the market the lack of experience by the financial sector in financing solar PV and onshore wind may justify the need for concessional finance to help renewables compete on par with fossil fuels that may benefit from lower financing costs. Long-term stability of policy and regulatory frameworks for clean energy are also needed to attract commercial financing for the sector. As more emerging and developing economies make pledges to phase down coal and other fossil fuels, and adopt sustainable finance regulation and practices, the cost of financing fossil fuel technologies will rise and reduce the level of concessionality needed for clean energy.

Determining concessionality and alternative mechanisms to concessional finance

Process solutions: assessing the required level of concessionality can be complex. Process solutions can help address information asymmetries and provide market signals on the appropriate levels of concessionality, and minimise the risk of over-subsidising investments and distorting markets. For example, in the case of large-scale renewables, the use of auction mechanisms has led to rapid cost declines and helped to overcome information asymmetries. For energy efficiency in SMEs, dedicated credit lines that can be accessed by intermediaries or businesses when certain criteria are met can be used to better target limited development funds.

Project preparation: developers of renewable energy and energy efficiency projects in emerging and developing economies are often smaller local developers, many of whom are small engineering firms with limited to no financial knowledge or awareness of how to develop project feasibility studies that meet expectations of banks and other financial institutions. The provision of project preparation capital can strengthen project feasibility and increase the bankability of projects and facilitate access to commercial finance for clean energy projects. Such interventions could be structured via a revolving facility that provides reimbursable grants that are repaid on successful financial closure of a project.

Project structuring: many clean energy projects, particularly distributed renewable generation and energy efficiency projects are characterised by small ticket sizes (well below USD 1 million and some only in the USD tens of thousands) that often are too small to attract commercial finance or have high transaction costs making financing prohibitively expensive. Standardisation of such projects can facilitate financing

through lower project due diligence costs and also facilitate securitisation and aggregation of smaller projects into diversified funds that can more easily attract lower cost capital. A focus on designing blended finance to support replicability of financing models can help to broaden the investor base and facilitate greater mobilisation of private capital.[8] Blended finance mechanisms, such as grants that provide technical assistance to support project structuring, can help to attract additional sources of private capital. This includes institutional investors that require scale and liquidity, as few are able to take direct equity or debt positions in projects and require tradeable instruments. Support provided for structuring of green bonds by clean energy developers or financial institutions who use proceeds to finance clean energy projects can help to reduce financing costs and expand the capital base.

Sub-principle 2.D: Focus on commercial sustainability

Even discounting climate and wider social and development impacts, the value proposition for clean energy investment is increasingly attractive, as the costs relative to conventional sources of energy continue to fall rapidly with technological innovation and wider deployment. Costs will vary markedly across regions, however, and the overall risk-return profile of clean energy investment will to a large degree reflect country circumstances, as discussed under sub-principle 2.B. Nevertheless, analysis of the long-term costs of clean energy, including using indicators such as the levelised cost of electricity (LCoE), can provide insights into the long-term commercial sustainability of different electricity technologies. Other indicators that can be used to assess the commercial viability of clean energy projects are discussed in the sub-sector level discussions throughout Chapter 3.

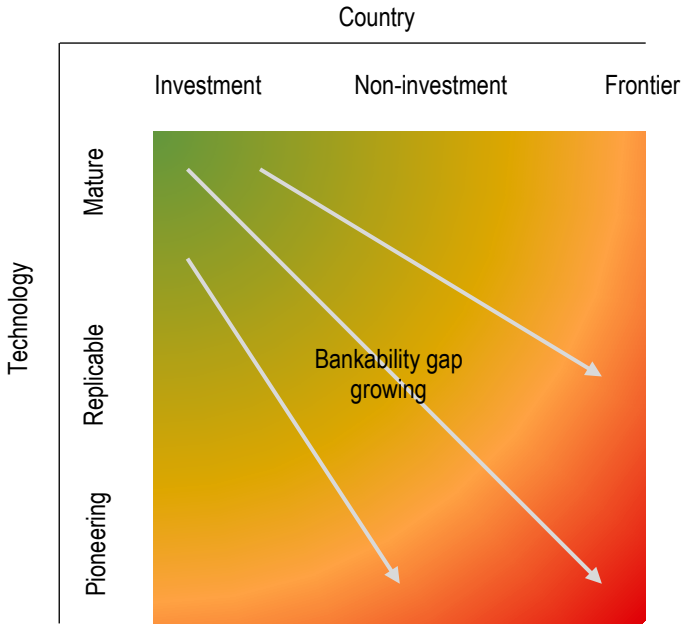
Decisions on long-term financing and ownership arrangements, commercial viability, and by extension on the degree of concessionality, need to be taken on a case-by-case basis, reflecting local and project specific conditions. It should not be taken for granted that full private sector financing, ownership, or control of assets is always possible, or even desired. Some clean energy projects with an overriding development objective, for example those providing energy access to remote communities where grid connection is not viable, may never have a path to long-term commercial sustainability, and may require permanent government support through subsidies or other mechanisms. Nor should it be taken for granted that blended finance is always necessary or sufficient to mobilise commercial capital. Undue intervention through blended concessional finance, in particular, can serve to distort otherwise functional markets, by over-subsidising investments, artificially making commercial finance less attractive, and deterring the involvement commercial finance.[9] It may therefore be more appropriate to tackle underlying risks through direct government action via policy reforms.

Judgements about the commercial viability of and the required degree of concessionality for specific investments, technologies and sectors will also need to be made on a case-by-case basis and reflect local circumstances at a particular time (see Figure 2.2). These judgements will vary over time, even in the same or very similar geographic contexts, given the rapid pace of technological, commercial, and financial innovation in the clean energy sector. Timing the exiting of blended finance is, therefore, difficult and subject to a range of factors.

[8] Although standardisation of processes can be useful in streamlining processes for project developers and minimise the costs of due diligence for investors, financing solutions should be tailored to project-specific risks and barriers to investment.

[9] The sub-sector analysis in Chapter 3 explores factors that can be considered to support assessments of required levels of concessionality, including the potential development additionality and current and future commercial viability of investments.

Figure 2.2. The bankability frontier



Source: Adapted from (Lankes, 2021[28])

As discussed in earlier sections, having a clear idea of the specific barriers to investment that a blended finance intervention intends to address and ultimately overcome is critical. As well as having a plan for achieving long-term commercial sustainability – financial viability to achieve returns and limited uncertainty in the form of limited volatility of cash flows (OECD, 2020[14]) – blended finance interventions need to be deployed as part of a wider strategy to address macroeconomic and investment climate barriers, as well as market fundamentals. In the power sector, for example, tariff strategies and mechanisms need to provide commercial investors with transparency on the stability of future cash flows.

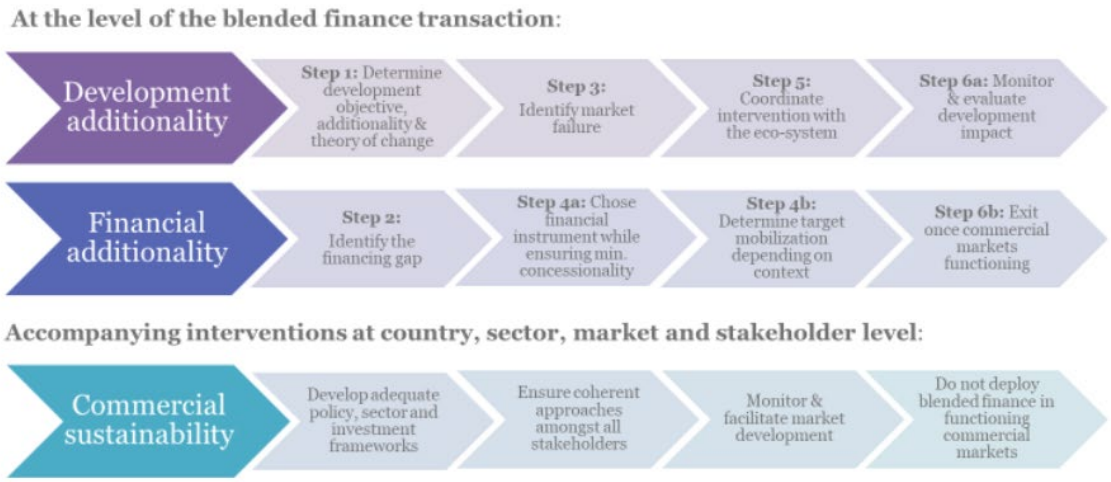
Achieving long-term commercial sustainability also requires a systemic approach that anchors financing decisions in a wider, concerted strategy to decarbonise sectors. This will often require multi-faceted approaches to blended finance, with different components of a sectoral transition requiring varying degrees of public support. Electric vehicles, for example, are not yet cost-competitive with internal combustion engine vehicles; blended finance can be used to incentivise investment by manufacturers, as well as charging infrastructure, whilst subsidies, an effective carbon price on petrol and diesel, and carbon border adjustment mechanisms can help shift consumer behaviour. The commercial viability of specific investments, and decisions on the use of blended finance, therefore need to be taken in a holistic manner with reference to the wider transition in a sector and beyond.

3 Clean energy sub-sector specific considerations for blended finance

Deciding whether and how to deploy blended finance most effectively – and how to situate it in a broader set of support measures – requires careful assessment of project, sector and country features, including barriers to investment, risks and market failures. These assessments can support more considered and nuanced decisions on whether blended finance is appropriate, and if so, how it should be designed to address these specific challenges. This includes decisions on the levels of concessionality, if any, the potential for private capital mobilisation and leverage, and the required duration of public involvement in clean energy infrastructure projects.

This paper will draw on the approach under the OECD's Blended Finance Principles – namely Principle 2: designing blended finance to increase the mobilisation of commercial finance – and outline sub-sector specific considerations for clean energy.

Figure 3.1. Step-by-step approach to implementing OECD DAC Blended Finance Principle 2



Source: (OECD, 2020[14]) *OECD DAC BLENDED FINANCE PRINCIPLE 2 Guidance - Revised Note following public consultation*

It will focus in particular on the follow steps:

- Step 3: Identify the market failure
- Step 4a: Choose the financial instrument while ensuring minimum concessionality
- Step 4b: Determine the target mobilisation depending on the context
- Step 5: Co-ordinate the intervention with the ecosystem
- Step 6a: Monitor and evaluate the development impact

- Step 6b: Exit once commercial markets are functioning

The sub-sector specific barriers to investment, risks and market failures identified in this paper will not be exhaustive; in practice project-level experiences will differ markedly across geographic contexts and interact with a wide range of general barriers to infrastructure investment. In some situations, the barriers identified in this paper will not apply at all; and their intensity and the extent to which they deter commercial investment, will also vary across projects and geographic contexts. This section is therefore intended to provide some general perspectives on clean energy sub-sector specific features and their implications for blended finance. It is intended to provide a conceptual foundation and guidance for analysis of projects, but this will also require careful consideration of local circumstances and context.

Development additionality and impact will be central to any blended finance transactions. The development impact of blended finance mechanisms[10] should be regularly monitored, with reporting of key indicators defined as part of results frameworks. These indicators should be reported at least annually to monitor impacts of blending interventions and include monitoring of market failures that blending interventions are intended to address. Where interventions are not progressing as anticipated, mechanisms should be restructured or exited to avoid an over subsidisation of the private sector. The following sub-sections set out possible indicators that can be used to assess development impacts of blended finance across clean energy sub-sectors, in line with Step 6a.

The scarcity of development finance, and a multitude of other development and climate action priorities, necessitates ending blended finance interventions as soon as commercial markets are able to function without public support; as per OECD blended finance guidance and principles, this should in itself be a key objective for the deployment of blended finance. This allows recycling of development finance to address market failures and development objectives in other sectors and areas, maximising its potential, whilst helping to minimise the risk of competitive distortions through unnecessary public support in functional markets. Judgements on when to cease blended finance interventions and withdraw development assistance will be driven by a number of factors. The following sub-sections present a number of clean energy sector-specific indicators that could be used to help inform judgements on commercial sustainability, and by extension, when to cease blended finance interventions, in line with step 6a.

Off-grid clean energy systems

Off-grid clean energy systems include a number of renewable power generation technologies and back-up power supplied through batteries and are operated independently from national electricity grids. These often provide electricity directly to consumers in stand-alone systems or are arranged in mini-grids that serve relatively small areas. They include solar photovoltaic (PV), commonly built on rooftops, small hydro, wind, biomass, and batteries for storage, often combined with diesel generators for backup. Their scale can range from individual households benefiting from solar home systems to commercial and industrial users benefitting from larger mini-grid solutions.

The overriding rationale for investment in off-grid systems is energy access: providing affordable, clean energy to underserved groups relatively quickly and cheaply, particularly in areas where grid extensions would be too costly or take too long to deploy. The development and financial additionality of development finance towards such projects is potentially very high: electricity access can have transformational social and economic development benefits, and relatively small amounts of development finance can help overcome barriers to investment and catalyse commercial finance. The relatively simple nature of projects, reduced dependence on wider grid infrastructure, and speed at which they can be deployed, provide

[10] See (OECD-UNDP, 2021[36]) *OECD-UNDP Impact Standards for Financing Sustainable Development,* OECD Publishing, Paris.

certain advantages for investors, including by contributing to a more diversified portfolio that can reduce risks compared to utility scale renewable investments.

Off-grid clean energy systems can also be designed to include productive uses. For example, solar PV can be used to power water pumps for irrigation, public lighting and broadband infrastructure, particularly in remote areas that are not connected to grids and for which generation and maintenance through fossil fuel powered generators is comparatively more expensive.

Sector-specific market failures, risks, and other barriers to investment

- Scale and transaction costs: Small absolute returns, and the relatively high cost of conducting due diligence on projects, mean that off-grid renewables and mini-grid solutions are often too small to attract the attention of commercial investors. There is therefore often a gap between the potential for commercial returns and the development impact. In some cases, purely commercial financing in the long term may never be possible to realise the full development benefits of distributed renewables. In these cases, a permanent subsidy may be more efficient than blended finance solutions.
- Stability of revenues: Long-term power purchase agreements (PPAs) that set the financial returns for investments in electricity generation capacity, and which guarantee stable returns for investors, can be central to the value calculus for investors. Off-grid renewables do not benefit from the stability of PPAs or other pricing structures such as net-metering, which allow producers to sell excess capacity to the grid. In addition, customers are typically from low-income households and are unable to commit to stable long-term payments for electricity. Accurately assessing supply and demand, and setting optimal pricing can also be difficult, since distributed renewables rarely go through a system price discovery through auction, even with the aggregation of small projects into large tendering blocks (IEA, 2021[1]).
- Information asymmetries – difficulty in assessing viability of projects: One by-product of the aforementioned two points is that the commercial viability of these projects can be difficult to assess. This is compounded by a lack of capacity among domestic financial institutions and international investors with limited capacity or willingness to invest in small projects, despite their potential for significant positive development impacts. The business model of distributed renewables is also much newer and does not benefit from tried and tested structures and legal arrangements that utility-scale renewables inherit from incumbent technologies, and which remain valid (including, for example, PPAs).
- Information asymmetries – profile of developers: Most investments in off-grid renewables are undertaken by consumers and SMEs, rather than by utilities and energy project developers, as in the case of utility-scale renewables. Developers typically have little or no track record in renewable energy investments, and as such have no or poor credit ratings. These factors can be a barrier to investment that result in a high cost of capital.

Choosing financial instruments while minimising concessionality

Aggregation and securitisation: Blended finance can be used to support aggregation of small projects into larger financial products that are more attractive to commercial investors. Project aggregation and securitisation can help address the lack of capacity and interest of large institutional investors by pooling projects into much larger, more attractive and rateable assets. These can be comprised of assets from across different jurisdictions for collective de-risking, underpinned by standardised contracts and harmonisation of regulatory frameworks. For example, grants can be used to provide pooled off-grid renewables projects with shared legal services, technical advice and common documentation in a more cost-effective way than would be possible for a single project. Other financial instruments in this regard are Green, Social, Sustainable and Sustainability linked Bonds (GSSS Bonds). Alongside blended finance,

there is also a role for impact investors in developing structured finance products, such as asset-backed securities, to bring products to market.

Aggregating smaller projects in special purpose vehicles (SPVs) and securitised products can also be used to allow credit ratings agencies to assess the creditworthiness of aggregated investments, and act as a proxy for due diligence (IRENA, 2016[25]), to help address information asymmetries and creditworthiness constraints of small developers. Securitisation involves structuring projects in special purpose vehicles to raise funds by issuing debt securities, which are sold to investors (Figure 3.2). The proceeds are used to purchase receivables, which represent rights over financial obligations, for example a solar investment repayment schedule, normally generated by established entities such as financial institutions or companies (ESMAP, 2020[29]).

A permanent concessional element, for example direct public equity in projects accepting lower returns, may be a more appropriate solution to overcome the problem of small project size, if the scope for blended finance to achieve adequate long-term financial returns is limited. This can often be justified on the basis of the large development impact and value of money of public interventions to support energy access.

Figure 3.2. Visualising securitisation

Source: OECD (2018), *Making Blended Finance Work for the Sustainable Development Goals*, https://doi.org/10.1787/9789264288768-en

- Grants: Grants can be used to finance technical assistance to support project preparation to improve their bankability, providing legal and financial services to small developers, to help close information gaps for investors. Grants can be used in the early stages of projects to formalise proof of concept, or to scale up operation (ESMAP, 2020[29]). They can also take the form of results-based financing, in which payments are made to companies or customers upon delivery of a predetermined milestone, for example generation capacity installed (ESMAP, 2020[29]). Reimbursable grants to fund capital intensive and risky project development, such as the exploration phase of geothermal projects, can be used to provide de facto junior equity and can be paid back once riskier phases of projects are passed, and redeployed to other projects.
- Guarantees: Revenue guarantees can be used to protect investors against the risk of revenue shortfalls, particularly in the early stages of distributed renewables projects when the risk of misalignment of demand and supply is higher. Partial risk guarantees can be provided against the financial impact of more discreet project-specific risks, such as licensing and permitting.

Box 3.1. Pro Mini-Grids Programme, Uganda – GIZ

Project objectives

The Pro Mini-Grids programme supported the government of Uganda in securing private investments for solar mini-grids in 15 villages in the south of the country and 25 in the north of the country. The programme provided subsidies on capital expenditures for generation assets and support for project aggregation and contract preparation to simplify procedures and create a larger ticket size for investors to pursue.

Barriers to investment

The small and disaggregated nature of off-grid projects creates challenges for mobilising investment at suitable scale to meet electrification targets, as these projects are generally too small to attract large investors. During the project development phase, individual site tendering for small projects creates high transaction costs and uncertainty pertaining to government licencing and approval processes increases the risk of unrecoverable planning costs if the project does not go ahead. Equally, lenders are particularly conscious of risks affecting mini-grid operations, including early arrival of the national grid and changes in consumer tariffs, which could negatively influence cost recovery.

Financing strategy

Typically, renewable mini-grid access projects are dependent on some form of subsidy to account for the high upfront capital cost and the low ability to pay of consumers. Under the Pro Mini-grid programme, Winch Energy, the winner of the tender, was eligible to receive a subsidy of up to 80% of the total upfront capital cost including generation and distribution infrastructure and connections, under a results-based financing instrument designed to catalyse private investment.

By bundling projects into a multi-site tender, the pilot was able to attract a larger developer who could benefit from economies of scale on project costs. The developer's risks were also reduced as contracts and agreements were pre-drafted, financing mechanisms determined in advance, and the electrification authority involved in site selection.

The developer was able to further aggregate the first 25 projects awarded in Uganda with other projects awarded under a separate tender in Sierra Leone. This allowed it to establish a financing vehicle, with NEoT Offgrid Africa to mobilise USD 16 million in debt and equity for both projects. This included a USD 4 million syndicated facility between FMO, the Dutch entrepreneurial development bank, and the Renewable Energy Performance Platform (REEP).

Source: (GIZ, 2020[30])

Determine target mobilisation

Off-grid renewables investments are usually driven by energy access goals for the most underserved communities and geographies. The ability of consumers to pay is therefore a critical consideration in pricing, levels of concessionality, and on target mobilisation. Projects with the least clear or longest route to commercial sustainability may benefit from co-financing through direct subsidies, rather than blended finance with an indefinite duration.

Financing structures, and the profile of concessionality, can be designed to address the high degree of upfront uncertainty and information asymmetries associated with off-grid renewables, both within projects and across wider geographies. Up-front support for the development of robust and stable projects with clear value propositions, even with relatively low returns, can provide good value for money for the use of

public funds by potentially unlocking private investment without committing scarce public resources to the long-term provision of concessional finance or subsidies. Mobilisation strategies may require low target leverage ratios in the design, construction and early operation stages of off-grid projects, but aim to rapidly bring in private investment once projects have been proven to be viable.

Co-ordinate the intervention with the ecosystem

Compared to other clean energy sub-sectors, the required policy and enabling conditions for off-grid renewables will typically be less complicated, owing to the relative simplicity of projects. Nevertheless, the successful deployment of blended finance requires strong co-ordination amongst policy makers, project developers and financial institutions. The involvement of stakeholders on the ground in particular, including local communities and consumers, is critical to understanding the development need, demand and potential impact of services. Co-ordination and strong stakeholder engagement are also critical effectively for identifying and exploiting synergies between energy access and wider development objectives, for example to support productive end-use of energy.

Strong co-ordination and institutional arrangements are also critical among stakeholders on the financing side of projects. For example, where blending is used to aggregate individual projects into larger financial products, institutional arrangements need to be designed to ensure that risks are appropriately managed by the party best able to bear them, and do not slip between the gaps. This may include, for example, ensuring that adequate due diligence is carried out at both the project and fund levels.

Box 3.2. Spotlight: Blended Finance and Risk Mitigation Facility for Solar in Africa – International Solar Alliance (ISA)

Project objective

The majority of the population in sub-Saharan Africa are either unelectrified or do not receive adequate electricity access: only around 50% of the population have access to electricity, and per capita energy consumption is around 20 – 100 kWH, against basic needs of around 300 kWh. Providing energy access to these groups will be a major contributor to SDG 7.

Sub-Saharan Africa has great potential for solar PV. But installed capacity stands at 5 GW, versus 755 GW total installed capacity in the rest of the world.

Barriers to investment

A significant scaling of investment, including from the private sector, is required, but significant barriers to commercial investment remain. Solar projects in sub-Saharan Africa are typically greenfield, in untested markets, developed by project sponsors with limited experience and operating track records, and using innovative products and business models.

Financing strategy

ISA's strategy is to address these risks with a suite of targeted solutions:

- technical assistance for capacity building of regulators to address socio-political, regulatory and land rights/ expropriation risk
- currency and interest rate swaps to address foreign exchange risk
- early-stage risk financing through investment in equity or convertible instruments and moratoria on principal repayments to address revenue and liquidity risk
- capacity building of project sponsors to address execution risk.

ISA's Blended Finance Facility, currently under development, are expected to attract USD 5-10bn of follow-on investment in solar in sub-Saharan Africa over the next decade, enabling energy access to 35-40 million households in the region.

Source: International Solar Alliance, presentation to OECD COP26 Virtual Pavilion

Exit once commercial markets are functioning

Termination of public support should be determined primarily by the ability of projects to continue to function without it. Off-grid and mini-grid systems that have a high development impact may justify prolonged use of public (including concessional) finance. Assessing commercial viability will be subject to a range of local, project and sector-specific factors. Table 3.1 sets out possible indicators to help development practitioners assess the appropriate moment to end support through blended finance.

Table 3.1. Indicators to support decisions on exiting blended finance interventions in off-grid and mini-grid systems

Indicator	Rationale
Price competitiveness: ability to pay and cost versus incumbent technologies *percentage of average income of target group spent on energy; cost differential with incumbent technologies*	As well as being a central objective of energy access, affordability is a central consideration for commercial sustainability. High prices reduce the competitiveness of renewables versus incumbent technologies, for example diesel generators for electricity, particularly in the lowest income households for whom the demand for clean electricity is more elastic.
Scale targets *number and profile of customers; electricity demand (MW/h)*	Larger and pooled projects that reach a larger number of consumers can help mitigate some of the risks associated with off-grid renewables. Access to a larger customer pool, for example, can help ensure stable demand. Projects with larger capacity may benefit from economies of scale, driving down the cost of generation.
Stability of revenues *data of revenue and profit fluctuations*	Well-designed and managed projects should benefit from improved stability of revenues over time, as operational experience closes information gaps of revenue potential, and operators become more adept at managing supply and demand. A proven track record of stable revenues can help attract commercial investment.

Monitor and evaluate development impact

The development impacts, and continued development additionality, of a project can help determine the optimal level of public support. Assessments of development impact should also factor in wider associated development impacts; for example, off-grid and mini-grid projects can be developed as part of a larger strategy to support regional and local economic development, for example through agricultural development and improvements to irrigation infrastructure, or as part of a concerted drive to improve social development outcomes, including health and education. A non-exhaustive list of development impacts and indicators associated with off-grid and mini-grid projects is set out in Table 3.2, below.

Table 3.2. Indicators to monitor and evaluate development impacts from blended finance interventions to support off-grid and mini-grid systems

Indicator	Rationale
Energy access: health, education and social *MW of additional electricity capacity; number of new electricity connections to households; air quality and health indicators (including reduced illness and*	Off-grid and mini-grid investments can significantly improve social, health and economic outcomes for some of the most underserved communities. Incumbent energy sources, including diesel generators and dry dung for cooking, are associated with significant negative health impacts, disproportionately impacting women and children. Measuring the impacts of energy access should also cover the reduction of these and other harms.

premature deaths from air pollution)[11]	
Energy access: economic *jobs created (direct and indirect); new electricity connections to firms*	Energy access also provides significant economic benefits, by supporting commercial enterprises, the deployment of other economic infrastructure (such as telephone and internet connections), and industrial development.
Emissions reduction *t of CO_2*	Off-grid and mini-grid renewables can reduce greenhouse gas emissions by displacing incumbent fossil fuel technologies.

Energy efficiency

Energy efficiency investments span a wide range of technologies that cover the end-use sectors of buildings, industry, and transport. They include investments in more efficient equipment (including lighting, heating, ventilation and air conditioning, motors, and industrial boilers, among other equipment), as well as investments in new industrial production processes, extensive building retrofits, electric vehicles and public transport. A large number of market barriers exist for energy efficiency and conservation investments, many of which require stronger regulation to drive consumer behaviour and help create market demand. The below is a non-exhaustive list of market failures, risks and other barriers to investment, focusing on those that have the greatest impact on financing. Some of these cannot be addressed by blended finance alone, and continued policy reforms and strong energy efficiency regulation need to be implemented in parallel.

Sector-specific market failures, risks, and other barriers to investments

- Public goods: Certain energy services, such as public lighting and transport, are often provided by local or regional governments. The access to affordable finance of local or regional governments may be limited by high outstanding debt levels or low credit ratings. For public lighting, the energy service company (ESCO) model has proven extremely successful in the reduction of LED costs through large scale public procurement that has led to sharp cost reductions. Under this model, investments are borne by the ESCO and not the local governments. One of the most successful examples of this is India's LED street lighting national programme (SLNP) developed by EESL, India's super ESCO.

  The provision of public transport services and installation of EV charging networks benefit the broader public, but large capital investment requirements may create barriers to investment. Ridership, penetration rates and hence demand can be difficult to predict in early market entry and the private sector may not be willing to take on such early market risks. Public support may be needed in these areas to support deployment and investment. The suitability of blended finance versus direct subsidies in these cases will depend on whether sustainable business models can be developed to attract commercial finance.
- Scale and high transaction costs: Many energy efficiency projects are relatively small (well below USD 1 million and in some cases in the tens of thousands), leading to high transaction costs for potential investors. Access to commercial finance often requires a certain scale to be attractive given the high cost of project due diligence and structuring. Energy efficiency projects may also be

[11] The World Health Organisation provides a more comprehensive set of indicators related to household air quality and health outcomes under SDG 7.

considered unique in nature with varying project characteristics, given the wide sector coverage; investments include deep building renovations, chiller replacements for buildings, installation of waste heat recovery systems in heavy industry, and efficient motor systems in micro, small and medium enterprises. This lack of standardisation increases transaction costs as financial institutions may be unfamiliar with technical specifications of different types of energy efficiency projects, which can increase perceived risks of projects.

- Information asymmetries and confidence in projected energy savings: The performance of energy efficient equipment can be impacted by operational know-how and local climate and resource aspects, as well as consumer behaviour, which can lead to differences between actual and expected performance. For example, performance of new technologies in new markets (high efficiency low emissions cooling systems that may be the norm in OECD countries are only starting to penetrate the market in emerging and developing Asia) also suffer from inadequate data on asset performance for financial institutions to perform risk assessments, and data provided by developers in feasibility studies may differ from actual performance. The lack of reliable national data on energy efficiency project performance can hinder market development and lead to higher financing costs or deter commercial finance altogether. Policies and programmes to support energy performance labelling can help to address information asymmetries and increase investor confidence.
- Collateral requirements: Many small and medium enterprises (SMEs), including small energy service companies (ESCOs), lack the capital base necessary to access affordable debt finance. Loans for undertaking energy efficiency investments are often declined due to insufficient collateral or access to guarantees. ESCOs that make investments on behalf of asset owners also face the additional challenge that the cash flows from energy savings may not be recognised by banks, and where the energy efficient equipment transferred to the asset owner cannot be considered as collateral.
- Energy subsidies (electricity and fossil fuels): Subsidies continue to create market distortions in the use of fossil fuels and reduce the attractiveness of energy efficiency investments. These inefficient subsidies typically lead to wasteful usage of fossil fuels and electricity, and create major barriers to the adoption of energy efficiency technologies and conservation as consumers do not have adequate price signals to change behaviour. Moreover, many beneficiaries of these subsidies are in higher income classes that no longer require public support.

Choosing financial instruments while minimising concessionality

- Energy savings insurance: Many asset owners, particularly small and medium enterprises as well as local banks, lack the technical capacity to properly assess the risk and return of energy efficiency investments; in many emerging and developing economies, efficiency investments have therefore been limited to those with very short pay back periods. To increase confidence of the bankability of efficiency investments, energy savings insurance products have been developed to cover any shortfall in projected savings with actual project performance. The Inter-American Development Bank (IDB) has been leading the development of energy saving insurance with projects currently running in eight countries. Once fully implemented, this programme is estimated to lead to energy efficiency investments of USD 10-100 billion with annual emissions reductions projected at 27-234 Mt CO_2 by 2030[12] (The Global Innovation Lab for Climate Finance, 2015[31]).
- Partial risk guarantee or first loss facility: Risk sharing mechanisms that provide partial coverage to partner financial institutions or take first loss in case of non-performance can help to overcome issues of information asymmetry and lack of adequate performance data, and provide private

[12] More details on the energy savings insurance programme developed by IDB can be found here.

financial institutions more confidence in financing projects. By addressing certain perceived risks and helping to establish experience and better performance data, these instruments can help to establish a track record for energy efficiency project performance and build confidence among local financial institutions.

- Equity capital fund for energy efficiency: To help SMEs overcome barriers to adequate equity capital requirements, equity funds can be used to provide a share of the capital or collateral requirement to access financing. The lack of capital is particularly pronounced and a major barrier for the establishment of ESCOs that tend to be small firms, where limited equity capital is consumed in financing the first projects and further development is restricted by lack of equity.
- Asset-backed securities: Energy efficiency project loans (including mortgages on certified buildings or mortgage financing for energy efficiency upgrades) can be pooled together to create asset-backed securities to free up capital for additional lending. The financial instrument, or ABS, is backed by the mortgage or lease receivables and structured as a bond that can be sold to investors. Development finance institutions can provide technical assistance to structure these transactions and, if needed, also provide partial risk guarantees to improve the credit rating of underlying financial assets.
- On-lending schemes and revolving funds: Dedicated credit lines to domestic financial institutions for on-lending to energy efficiency projects can help raise awareness on energy efficiency projects. Such a scheme could include concessional loans aimed at low-income households and MSMEs that lack access to affordable sources of finance and tend to purchase cheaper equipment that is typically more energy intensive due to capital constraints. On-lending facilities can also be designed as revolving funds, with repayments of capital and interest re-invested in additional energy efficiency projects. Schemes should include stringent energy efficiency requirements that are regularly reviewed to ensure they reflect the latest improvements in technology performance.

  In countries with limited or no experience in financing energy efficiency, such schemes can help local financial institutions gain experience and better evaluate actual risks of energy efficiency investments and help overcome barriers associated with perceived risks and lack of trust in energy audits. They can also be combined with technical assistance to support capacity building among local financial institutions. Overcoming these early market barriers can help build much needed experience and data on local project performance for technologies that are new to market but mature in other countries. Such schemes should be designed, where possible, to pull in capital from partner financial institutions to ensure such interventions have a clear mobilisation impact. Early interventions designed to provide capital for energy efficiency adoption may not have prioritised mobilisation in their design, and when such programmes ended future uptake was therefore limited. This highlights the need for other interventions that raise awareness and develop local capacity for developing and promoting energy efficiency adoption, including through more stringent policy and regulation.

Box 3.3. Energy Efficiency and Conservation Financing Promotion Project, Bangladesh – JICA

Project objective

The Japan International Cooperation Agency's (JICA) Energy Efficiency and Conservation Financing Promotion Project in Bangladesh is designed to promote energy savings for industry and other economic activity, including the commercial buildings and residential appliances sectors. The project provides incentives to private firms to install updated energy efficient equipment to their production systems.

The project aims to nurture market development for energy efficient equipment by providing access to public finance for industrial firms. The project aims to contribute to reduce Bangladesh's national energy intensity, measured as the ratio of total primary energy consumption to real GDP. The project aims for a 20% improvement by 2030 compared to 2015, reflecting Bangladesh's Energy Efficiency and Conservation Master Plan.

Barriers to investment

Though investment in efficiency can yield savings over the long-term, the positive externalities are not reflected in the cost of investment. Information asymmetries also exist, in the form of limited access to information about the availability and applicability of the latest technology to local contexts. These market failures are exacerbated by the prevalence of energy subsidies, which further tip the balance against investment in efficiency.

Financing strategy

JICA is providing loans to the Government of Bangladesh (GoB) in two phases (including the cost for consultancy services):

- Phase 1: JPY 11,988 million (0.01% interest rate, 40-year tenure with 10-year grace period)
- Phase 2: JPY 20,076 million (0.90% interest rate, 30-year tenure with 10-year grace period).

The process is designed as a two-step loan: JICA provides finance to GoB institutions (IDCOL and BIFFL), which is then lent to private sector end-users (sub-project owners). The typical terms of the loan from IDCOL/BIFFL to the end-users have a 4–7% interest rate and repayment period up to 10 years. These loans are only eligible for the procurement of eligible energy efficient equipment.

Investment in efficiency is often dependent on parallel investment in conventional equipment and construction. The project therefore takes a tailored financing approach, whereby investment in energy efficiency is supported directly with loans financed by the project, whilst indirectly helping to mobilise wider associated investment (for example construction and renovation of buildings) through commercial channels, supported by the GoB.

Source: Japan International Cooperation Agency (JICA)

Determine target mobilisation

Energy efficiency measures cover a wide range of actors, ranging from households and small businesses to municipal, regional and central governments, and large conglomerates. Determining the target mobilisation for the chosen blending instrument will depend on identifying a number of elements, including maturity of the energy efficiency market, prevalence of suitable business models to monetise benefits, the availability of capital market instruments for financing efficiency and conservation investments, choice of

financial intermediary and appropriate implementation channel, experience and ability of commercial investors to evaluate efficiency and conservation investments, and appropriate benchmarks for reference.

For investments related to households, retail banks (including digital banks) and other financial institutions specialising in mortgages and consumer credits will have the best networks for reaching potential consumers. Smaller regional banks and other financial institutions targeted at MSMEs may be best suited to reaching small and rural businesses, while larger banks will be best suited for energy efficiency and conservation investments for larger corporates and larger public transport and government building retrofit programmes.

The scale of investment and whether suitable aggregation models are available to pool smaller projects together will determine which commercial investors can be targeted. The level of maturity of local capital markets as well as financial regulation may limit potential solutions; for example, in India domestic pension funds can only invest in instruments rated AA or above, and the relatively small size of many bond markets in emerging and developing countries are often limited to government bonds.

Co-ordinate the intervention with the ecosystem

Development partners have been actively supporting energy efficiency adoption in emerging and developing economies, providing technical assistance to governments to strengthen policy and regulatory frameworks and to the private sector to help identify and develop market opportunities for energy efficiency implementation. Blended finance programmes targeted at mobilising private capital for energy efficiency should take stock of past efforts to support energy efficiency adoption and build on the success as well as learnings of past programmes. They should take a holistic approach and where possible look to support project standardisation and replication. This may include grant funding for the development of technology lists and standardised documents to facilitate and reduce due diligence and transaction costs. The development of internationally-harmonised sustainable finance taxonomies can also play a role in the identification of projects and facilitate the linking of international investors with credible domestic investment opportunities.

Efforts to standardise energy efficiency projects will facilitate aggregation and securitisation of smaller projects into larger transactions that can draw the attention of institutional investors. Co-ordination and capacity building may also be needed with domestic financial institutions as well as asset owners (i.e. building and factory owners) to build awareness and improve confidence among local investors on the viability and attractiveness of investments in energy efficiency. National development financial institutions could be tasked with helping to build capacity of local financial institutions and other actors. Local financial institutions seeking to support their clients in the net zero transition can also help to raise awareness on the benefits of energy efficiency investments and hence influence demand for projects. Interventions should be closely co-ordinated with energy regulators responsible for setting energy efficiency standards to ensure that blended finance interventions are pulling in best available technologies in the market and where technology availability is lagging behind other markets creating the necessary conditions to address these technology gaps.

Box 3.4. Regional Energy Efficiency Programme (REEP), Western Balkans – EBRD

Project objective

The Regional Energy Efficiency programme (REEP) was established in 2012 as a joint collaborative programme between international financial institutions (EBRD since 2012, KfW since 2017), the European Commission and bilateral donors under the Western Balkans Investment Framework (WBIF). The overarching development objective has been to promote a sustainable market for energy efficiency in the Western Balkans.

REEP successfully blends international financial institution financing with EU and bilateral donor grants to offer an integrated package of targeted policy dialogue, technical assistance, and financing facilities for SMEs, households and municipalities deployed both directly and through local partner banks. To date, the programme has deployed successive rounds of funding and has evolved in scope to address emerging needs across sectors. The programme has reached a cumulative signed volume of EUR 297m in credit lines and EUR 143m of direct lending to private and public projects**,** thus supporting over 1000 SMEs, 12,700 households and 290 public buildings in 700 cities and towns across the region. As of mid-2022, the mitigation impact of the underlying portfolio amounts to 842,000 MWh/year energy savings, 540,000 CO_2/year avoided and 120MW new renewable energy capacity installed.

Barriers to investment

The region is characterised by relatively high energy, resource and carbon intensity. High early-adoption costs for green solutions, low awareness of market participants of the benefits of green investments, lack of capacity with energy and resource efficiency technologies, and lack of effective regulatory frameworks obstruct energy efficiency progress, particularly in the residential sector. Market barriers, in particular affordability constraints, have become more prominent as a result of macroeconomic developments and local consequences of the heightened geopolitical risks.

Financing strategy

The EBRD undertook market demand studies and analysis which considered technical, economic and behavioural perspectives of the residential buildings and other targeted sectors, to help identify barriers and analyse appropriate levels of concessionality. The Bank consulted its network of partner financial institutions throughout the region to help identify new market opportunities and understand the support needed to deliver financial incentives, which was entirely new for the financial sector at the time.

Integrated credit lines extended through REEP have provided financing to local partner banks for on-lending to finance investments to private sector sub-borrowers in the residential and commercial sectors. These are complemented by performance grants to sub-borrowers to incentivise early movers, help address prevailing market barriers and ensure the maximisation of energy efficiency impact from the portfolio of financed sub-projects. An integrated TA package supports local financial institutions with capacity building, awareness raising and knowledge transfer on green technologies.

Investment by households, corporates and municipalities are being supported by offering new financing instruments, such as innovative models for financing multi-apartment buildings through public intermediaries, financing schemes for sustainable heating and cooling and expanding existing instruments to new sectors, e.g. retail and construction companies or to heating and cooling technologies in the public sector. The financing strategy is complemented by policy dialogue and technical assistance, both of which help create an enabling environment for energy efficiency and other low-carbon investments.

Source: European Bank for Reconstruction and Development

Exit once commercial markets are functioning

Determining when to reduce or end public support for energy efficiency investments requires the monitoring of market developments and cost reductions, and tracking energy efficiency regulation and other related policies that impact the attractiveness of adopting more energy efficient equipment or measures. Signals that commercial viability is approaching include reductions in the cost gap between incumbent technologies, growth in market share, increase in the number of ESCOs, the adoption or increase in the stringency of minimum energy performance standards and developments in energy prices, including the phase out of energy subsidies. Table 3.3 identifies a number of indicators that can be used to assess the market maturity for energy efficiency technologies and evaluate readiness of phasing out public support.

Table 3.3. Indicators to support decisions on exiting blended finance interventions in energy efficiency

Indicator	Rationale
Number of transactions	For interventions aimed at demonstrating technological viability in a new market or establishing suitable business models, placing a limit or setting a goal on the number of transactions may be appropriate to determine a suitable end or exit.
Cost targets *$*	Declining equipment or installation costs are a strong signal of market creation. Setting cost targets or monitoring for signs of cost reductions can help to signal an appropriate time for exit or evaluation of programmes.
Penetration rates *market share %*	Determining a target penetration rate based on market share of new equipment sales and or installations could be an option to determine when a market has reached sufficient maturity.
Project replication without support *Y/N*	Existence of project replication without the need for public interventions is a clear sign that the market is ready to drive development and a strong exit signal, while the absence of market interest without sustained support could indicate that significant risks and barriers remain.
Energy subsidy reform *measures taken to phase out subsidies Y/N*	The presence of energy subsidies distorts markets and creates a disincentive to investment in energy efficiency. Measures to remove subsidies can be a sign that project economics are improving and sustained support for energy efficiency may no longer be needed. At the same time, if no progress on fossil fuel subsidies is made, continued support may not be warranted until such policy reforms are adopted and limited public funds may be better targeted to other areas with greater potential to have additional development impact.
Regulatory reform *introduction or strengthening of minimum energy performance standards Y/N*	As energy efficiency standards are introduced or strengthened, the market for energy efficiency products will rise. Monitoring of regulatory reforms on minimum energy performance standards and other energy efficiency policies can help to signal the development of early markets.

Monitor and evaluate development impact

Energy efficiency, often considered the first fuel, provides multiple benefits beyond the reduction in energy use and fuel cost savings that support broader development goals. These include job creation, emissions

reduction, improved safety for women and girls, and better indoor air quality and comfort that can improve health and education outcomes and increased productivity. For energy efficiency a range of development benefits can be tracked depending on the end use application (Table 3.4). The below set of indicators is a non-exhaustive list of recommended indicators for monitoring and evaluating the impacts of blending interventions supporting energy efficiency and conservation measures.

Table 3.4. Indicators to monitor and evaluate development impacts from blended finance interventions to support energy efficiency

Indicator	Rationale
Energy savings per year *PJ or GWh*	Improving energy efficiency is central to achieving SDG 7. For energy importing countries this can also have important energy security, fiscal, and current account benefits.
Cost savings *$*	Reduced energy consumption leads to cost savings and can improve affordability for households, governments, and businesses. These savings can be invested or spent elsewhere, for example on education, health, food or invested back into businesses.
Emissions reduction *t of CO_2*	Reducing energy consumption of either direct fuel use or indirect fuel for power generation reduces CO_2 and other GHG emissions. This helps to mitigate the impact of climate change and improves air quality through reduced emissions of pollutants such as SO_2, mercury and particulate matter.
Employment *number of direct jobs created*	Many investments in energy efficiency, such as building retrofits or installation and maintenance of more energy efficient equipment or provision of public transport services support job creation.
Reduction in incidence of violence, and increased participation of women and girls in employment and education *% reduction or reduction in number of cases*	Improvements in efficiency can improve the coverage of transport and public lighting, which can in turn improve women and girls' safety. This can increase women's ability to seek employment and facilitate education for girls. Public transport is one of the key opportunities for reducing energy use in the transportation system and LED street lighting provides reliable low-cost public lighting.
Deployment of efficient cooling systems *number of units or penetration levels*	In hot and humid countries, improvements in indoor comfort levels and air quality through efficiency and low emissions cooling can improve health, productivity and well-being. This will be increasingly important as the impacts of climate change intensify and many regions are exposed to heat stress.

Box 3.5. Energy Savings Insurance Program, Colombia – Inter-American Development Bank

Project objective

The Energy Savings Insurance (ESI) pilot program in Colombia was launched in 2016 under the leadership of Bancóldex, a Colombian national development bank, with financial and technical support from the Inter-American Development Bank (IDB), the Climate Investment Facility's (CIF) Clean Technology Fund (CTF) and the Danish government. The program offered a de-risking package consisting of both financial and non-financial elements designed to build investor confidence and drive investments in energy efficiency projects. The program was expected to support 104 firms to reduce about 13,977 tonnes of CO_2 emissions annually through energy efficiency upgrades.

Barriers to investment

Energy efficient technologies require higher upfront capital investments than conventional technologies, and returns are obtained over time in the form of energy savings and reduced energy bills. A key barrier to such investments is thus the lack of trust among investing firms that energy efficiency upgrades will deliver promised energy savings. Local financial institutions also lack the capacity to accurately evaluate creditworthiness of projects where eventual savings can be used to repay debt obligations, which further hinders firms' access to long-term financing at competitive rates and tenors for such projects.

Financing strategy

The ESI model combines medium- and long-term credit lines with three risk mitigation instruments that support the identification and structuring of technically robust and bankable projects: a standard contract, technical validation, and the energy savings insurance.

- The standard contract establishes the responsibilities of the supplier (supply and installation of equipment, guarantees, and expected energy savings) as well as the customer (timely payments, access to facilities, and adequate maintenance of the equipment).
- The technical validation is carried out by an independent validator who evaluates and confirms the project's technical potential to achieve the promised savings and verifies on site that the project has been built according to specifications. The validator also acts as an arbitrator in case of disagreements between customer and supplier in terms of actual savings generated by the project.
- The energy savings insurance is a performance warranty provided by the supplier to the customer for the committed savings over up to five years. If at any point in time, the project does not achieve the pledged savings, the insurance will financially compensate the client. The energy savings insurance is activated upon technical validation of the project.
- Insured projects are provided credit lines at special conditions, including preferential rates, grace periods and extended tenure. Subject to the availability of technical assistance resources, additional incentives are also provided to investors and technology providers, including free technical validation, specialised technical support, access to capacity building services, expedited credit evaluation, and preparation and dissemination of success cases in events and electronic platforms.

Source: Inter-American Development Bank

Utility-scale renewables

Utility-scale renewables include sources of renewable power generation developed at a scale that allows them to be connected to an electricity grid for general public, commercial, and industrial consumption. They include solar PV, onshore and onshore wind farms, geothermal, hydroelectric, biomass, and tidal power. Their scale exposes them to a number of risks facing large infrastructure investments: long planning, development, and construction timeframes; high exposure to political risk, including due to their sensitivity, and corruption; very high initial capital costs; and dependence on supporting policy and infrastructure to ensure their successful delivery and commercial sustainability. Under-developed local capital markets can also constrain commercial financing of utility-scale renewables, since local financial institutions often lack adequate headroom to extend capital at the required scale.

Investment in utility-scale renewables is intimately linked to the retiring of fossil fuel assets. The commercial viability of renewables will reflect, to a large degree, the viability of incumbent technologies and existing assets. Though the economics of the sector are rapidly shifting in favour of renewables, and there are signs that investor appetites are shifting away from fossil fuels, the transition will need to be managed carefully to minimise negative social impacts and maximise potential benefits. Financing strategies for renewable energy investment, including the deployment of blended finance, will therefore need to account for wider developments and plans in the sector, including the prevalence of fossil fuel subsidies, the impact on shifting generation patterns on consumption, including by industry, and wider distributional, labour market and social impacts, particularly in sectors that employ large numbers of people. Section 3 discusses possible governance and co-ordination structures that can support the development of coherent sectoral strategies. However, the scope of this paper is limited to the financing of clean energy, and the financing of fossil fuel phase-out will not be explicitly discussed.

Sector-specific market failures, risks, and other barriers to investment

- Long planning and construction phases: Large renewable projects are typically subject to long planning, development, and construction phases, with high exposure to political and administrative uncertainty. The long lead-in time before projects begin operation and yield revenues and returns for investors also makes it difficult to raise capital early in the project cycle. As a result, early-stage projects often depend on equity for a higher share of finance and struggle to raise funding on capital markets. Long project timeframes can also limit access to finance due to financial regulatory requirements, including Basel III's net stable funding ratio and Solvency II requirements, which can have the unintended consequence of deterring investment in infrastructure projects over long periods of time.
- Counterparty, off-taker and transmission line delay risk: Weak creditworthiness of local partners, such as power utilities who are often monopsony buyers of electricity, can increase the perceived or real risk of non-payment. Renewable power generation projects also often depend on the construction of new grid infrastructure, and critically, on the readiness of parallel infrastructure in time for generation. Offshore wind is also dependent on suitable port and marine infrastructure, as well as on the smooth functioning of complex global supply chains.
- Exchange rate volatility: Exchange rate volatility can create mismatches between obligations priced in US dollars and revenues denominated in local currency, a common feature of power purchase agreements for utility-scale renewable power generation projects in emerging and developing economies.
- Revenue volatility: The rapid growth and relative inexperience of stakeholders along the clean energy supply chain can result in inaccurate assessments of, and imbalances between, supply and demand. This can be compounded by the long-time horizon of clean energy investments.

- Financial stability: The single buyer model of many electricity systems in EDEs can create barriers linked to financial regulation that limits bank exposure to single entities as a way to mitigate financial risks. Many domestic banks are often fully exposed to debt holdings of the state-owned utility, which is often also the single buyer of power. This limits the potential to provide commercial finance to renewable power projects that hold power purchase agreements with the utility. Exposure to a small banking sector for a sizeable project may also mean that finance needs to be sourced from a number of financial institutions.
- Fossil fuel subsidies: Fossil fuel subsidies distort market dynamics in favour of incumbent technologies. Moreover, the value of fossil fuel subsidies is not always stable and is often adjusted in response to international market prices of inputs. This weakens the ability of investors to accurately assess the competitiveness of renewables investments.
- Resource uncertainty: Geothermal energy requires prospecting for optimal plant locations. This can be slow, uncertain, and entail high up-front capital costs, with no guarantee of a return on investment. Hydroelectric and wind turbines are also dependent on weather conditions, which can be variable. Variability and unpredictability may intensify over time in regions exposed to more intense climatic impacts related to weather patterns. Bioenergy can also be faced with fuel input risk.

Choosing financial instruments while minimising concessionality

- Direct investment: Direct investment can shift the risk-return relationship of a project in order to facilitate commercial investment and support an investee's financial sustainability. Concessional finance, for example, can bring down the weighted average cost of capital. Even direct investment by MDBs/DFIs at market rates can boost investor confidence, due to the former's experience in managing unexpected events, as well as their due diligence capacity. This benefit is amplified when MDBs/DFIs are invested at the riskier portions of the balance sheet, for example when they are equity shareholders (OECD, 2018[32]).
- Political risk insurance: The success of utility-scale renewable projects is often dependent on positive action by governments, including regulation (either new enabling policies, or removal of policy blockages), fiscal policy (including a favourable tax regime and the removal of fossil fuel subsidies); construction of parallel infrastructure (including transmission and storage networks), and often payments for electricity through state-owned utilities, transmission and distribution companies (for example through PPAs). Political risk insurance can protect against a wide range of risks: war, terrorism and civil disturbance; currency risk; breach of contract; expropriation; and non-honouring of financial obligations.
- Guarantees, performance insurance, and partial risk guarantees: Guarantees issued by governments or other public entities can send a strong signal to commercial investors of their commitment to a project, whilst also providing a safety net against financial loss. Guarantees can be a useful mitigant against the long development periods of utility-scale renewables, as well as against wider political, policy, regulatory, and currency risks.

  More targeted guarantees and insurance can help reduce the undue exposure of public finance to a wide range of risks. For example, they can be used to provide targeted cover against the risk of construction delay of transmission and storage infrastructure, or non-payment by utilities with weak creditworthiness.
- Currency risk hedging instruments and guarantee funds: Hedging instruments, including forward contracts and swaps can be provided by donors to offset currency risk. Swaps can be used to convert USD-denominated loan payments into local currency obligations. These instruments can be prohibitively expensive, however. Development finance can help reduce the costs of such

instruments by offering them on concessional terms. Currency risk guarantees can also address the high costs of hedging by covering against long-term exchange rate fluctuations.

- Grants: Grants can be used to finance technical assistance to governments and project developers to design bankable projects, including by advising on the design and delivery of pricing mechanisms. This can be particularly helpful for large, utility-scale renewables, since the size of investments and their importance for social and economic development requires careful upfront consideration as part of the project design and due to the complexity of pricing structures. Grants can also be used to support the development of structured finance products, for example to support the refinancing of operational assets and issuing of green bonds. Subsidised credit-enhancement facilities – supporting the establishment of a publicly accessible track record of credit performance – can also enable project loans to be refinanced through debt capital market and free up headroom to allow financial institutions to mobilise fresh lending towards the sector. Finally, grants can be used to finance early-stage development in more uncertain technologies, for example for geothermal projects that require prospecting of sites.
- Loan tenor extensions: Longer tenor loans, as well as other de-risking facilities such as subordinated debt and first-loss structures, can be used as part of a projects financing mix to help crowd-in commercial finance for longer periods of time in a way that does not undermine adherence to financial regulatory requirements.

Box 3.6. Scatec, MIGA and EBRD Green Project Bond, Benban Solar Park, Egypt

Project objectives

Benban Solar Park in the Arab Republic of Egypt is one of the world's largest solar complexes, consisting of 32 solar plants, with a total generation capacity of 1465 MW. It is a critical component of Egyptian government's ambitious Sustainable Energy Strategy for the period ending 2035, enabling the government to support its goal of generating 20% electricity from renewable sources by 2022.

In April 2022, Scatec and its partners refinanced the non-recourse project debt for six solar power plants, with a total capacity of 380 MW, that have been operational since 2019. The plants will provide an estimated annual electricity projection of 930 GWh, enough to provide energy to more than 420,000 households, avoiding 423,000 tons of CO_2 emissions per year. The project is underpinned by a 25-year power purchase agreement (PPA) with the Government of Egypt.

Barriers to investment

There is a lack of appetite from global institutional investors to invest in the financing of development and operation of renewable energy projects in emerging markets jurisdictions. An opportunity was identified in this project whereby the combination of risk mitigation instruments from MIGA and EBRD would lead to sufficient credit enhancement and ratings uplift that would be essential for attracting private capital investment.

Financing strategy

MIGA and EBRD worked together to create a credit enhancement mechanism for the project to address the risks to commercial investment. This was essential for attracting private capital investment, especially from major institutional investors who are mobilising investment contributions for the first time in Egypt.

Tranche A will benefit from MIGA's political risk insurance cover and a liquidity support facility provided by EBRD – which mitigates the risk of non-payment of debt service by the co-borrowers – thus enhancing the bond's credit and attracting a larger pool of investors. Tranche B will not benefit from the MIGA cover nor from the liquidity facility.

The proceeds from both tranches' issuances will be on-lent by the issuer to the six sub-projects as co-borrowers through a secured 20-year on-loan, matching the maturity of the bonds.

Source: Multilateral Investment Guarantee Agency, World Bank Group; (Scatec, 2022[33]), *Scatec refinances six power plants in Egypt with a Green Project Bond*, https://scatec.com/2022/04/28/scatec-refinances-six-power-plants-in-egypt-with-a-green-project-bond/.

Determine target mobilisation

Utility scale renewables have a strong track-record of commercial sustainability. Though they often face unique challenges and barriers to investment, discussed in the preceding sections, in general their long-term prospects are less uncertain than more nascent clean energy technologies. In addition, they can be anchored in supporting policies and mechanisms, such as power purchase agreements (PPAs), which provide a degree of certainty and stability of revenues for investors.

Levels of target mobilisation and leverage will be context-specific and vary significantly by geography and renewable technology, but there are ample examples globally of successful commercial delivery of a range of utility-scale renewables projects. The capital costs of onshore and offshore wind and utility-scale solar PV, in particular, have fallen rapidly in recent years. Wider risks, including around seasonal variability, are

better understood and managed, and will continue to reduce as storage technology improves. Importantly, these factors have also contributed to a more nuanced perception of risks, which has in turn lowered the cost of capital and increased the availability of commercial finance. Projects in these sectors can therefore expect to achieve a higher degree of mobilisation and leverage than more nascent technologies.

Geothermal and hydropower, and to some extent onshore wind, face a number of additional risks. These include long and sensitive permitting and licensing procedures, often against the backdrop of opposition from local stakeholders. Hydropower and geothermal projects are also highly site-specific, potentially exposing them to additional idiosyncratic risks that cannot be mitigated by situating them in another location. The profile of these risks is likely to be relatively constant over time, which will constrain the scope for higher degrees of mobilisation potential, leverage, and purely commercial solutions.

Co-ordinate the intervention with the ecosystem

The effective design, delivery, and operation of utility-scale renewables requires the active involvement of and close collaboration between a wide range of actors. This requires projects to be anchored in countries' wider development and decarbonisation plans, in order to most effectively exploit synergies with wider economic and social objectives and maximise their impact. This includes ensuring projects are designed and delivered in a way that minimises adverse social impacts, and take advantage of potential productivity and re-skilling gains, particularly if they are part of a wider shift away from fossil fuels in countries that employ large amounts of people in incumbent sectors.

The viability of utility-scale renewables investments is often dependent on a wide range of supporting policies and infrastructure. The regulatory and fiscal environments – for example legal frameworks that allow predictable pricing structures such as PPAs, and steps to phase out fossil fuel subsidies and correct other market distortions – can make or break projects. As discussed, utility-scale renewables also often require supporting infrastructure that is built and managed by other entities, for example transmission lines by state-owned distribution and transmission companies. There may also be opportunities to align utility-scale renewable projects with decarbonisation efforts by commercial and industrial users, for example by establishing net metering and net billing schemes (simultaneously addressing the risk of revenue loss as the generation by commercial and industrial users grows).

The size and complexity of utility-scale renewables often also requires complex financing arrangements, with different phases of projects financed by different actors through a range of instruments, including with varying degrees of state and donor support over their lifetimes. A typical utility-scale renewable project in an EDE might include the electricity generation project owner, one or multiple distribution companies, one or multiple transmission network operators, the electricity market regulator, the national and local government, national or international development finance institution(s), and locally-based commercial financial institutions; each may have a direct or indirect stake in the financing of the project, through direct involvement in the PPA, or by setting tariffs and providing subsidies.

Box 3.7. MOBILIST, ThomasLloyd Energy Impact Trust – UK Foreign, Commonwealth & Development Office

Project objectives

The Mobilising Institutional Capital Through Listed Product Structures (MOBILIST) programme – funded by the UK Foreign, Commonwealth & Development Office (FCDO) aims to catalyse the deep pools of institutional investment into developing economies to help address the USD 4-5 trillion annual financing gap facing the SDGs. MOBILIST will support a portfolio of investment products that will, through their listing on public markets, foster publicly available price and risk information, allowing investors to better appraise and price the risk of developing country assets. Investment proposals are sourced from the market that are backed by broker intermediaries and are assessed against the criteria of commercially viable, additional, replicable, scalable and feasible.

MOBILIST supports fund managers and similar intermediaries who seek to list products dedicated to assets in official development assistance-eligible countries in major and local stock exchanges. MOBILIST supports selected products to listing by investing equity on market terms and/ or providing technical assistance. An equity anchor investment can support a successful listing as it provides a clear commitment to the success of the product, giving investors the confidence to commit their own funds, thereby solving a coordination problem in the market. MOBILIST also supports its growing investment portfolio through research to support the programme's investment strategy and to identify and remove policy barriers to public markets mobilisation infrastructure.

Barriers to investment and mitigations

In 2021, MOBILIST supported its first investment, the ThomasLloyd Energy Impact Trust (TLEI), with an anchor investment of up to GBP 25m to support an initial public offering on the premium segment of the London Stock Exchange's main market. TLEI is an investment trust vehicle focused on investing in sustainable energy infrastructure projects – including renewable energy power generation, transmission infrastructure, energy storage, and sustainable fuel production – in developing Asia. Through its portfolio, MOBILIST aims to address a number of market failures, risks, and barriers to commercial investment in developing economies, including:

- Lack of data on price and risk: Developing country markets suffer from a lack of transparency on key investment appraisal metrics. TLEI listing provides publicly available pricing and risk information on developing country renewable assets.
- Lack of investable assets: Listed stocks and tradable bonds markets in frontier countries tend to be shallow and illiquid. The TLEI listing is one component of MOBILIST's work to surface investable assets with potential for scale in ODA-eligible countries.
- Fragmented markets: Private debt and private equity markets in developing countries are fragmented, which makes it difficult to access investments at scale. TLEI listed a pool of seed assets in India and the Philippines and, with capital generated through listing, plans to expand to Vietnam, Bangladesh, Sri Lanka and Indonesia. Investors can therefore access a pool of diverse assets at the quantum needed to meet their regulatory requirements.
- Lack of liquidity: A substantial proportion of the developing country assets are private with no developed secondary markets and there are very few listed securities that offer the traded volume necessary for investors to enter or exit. MOBILIST's strategy, including the TLEI investment, examines ways of aggregating private assets and bringing them into the regulated, publicly traded markets through a range of structures that are known to the market.

- Regulatory environment and regulatory constraints for investors: Institutional investors face regulatory constraints in their own jurisdictions which inhibit scaling up investment in developing countries (e.g. higher capital requirements). Investing in listed products in their own jurisdiction allows institutional investors to access developing markets whilst meeting their regulatory requirements.

Source: United Kingdom Foreign, Commonwealth, and Development Office

Exit once commercial markets are functioning

Utility-scale renewables are increasingly competitive with and in many cases provide a more attractive value proposition than fossil fuel generation. The most significant barriers to investment will often be disproportionately skewed towards the development and construction stages of projects. The use of blended finance to address early-stage risks should be time limited and aim both to exit early once projects are operational and for higher leverage ratios to finance design and construction, as compared to technologies and investments with less proven commercial track records. Increasingly, long-term blended finance or concessionality is only needed to support project development and tendering, or is not required at all. For example, blended finance can support local currency debt market financing, which can eventually be withdrawn once generation capacity targets have been met. Table 3.5 sets out possible indicators to help blended finance providers assess when to reduce or withdraw public financing.

Table 3.5. Indicators to support decisions on exiting blended finance interventions in utility-scale renewables

Indicator	Rationale
Stability of pricing and revenues *data of revenue and profit fluctuations*	Though utility-scale power projects typically entail agreement of payment structures and pricing up-front, for example through fixed tariffs under PPAs, investors may still require certainty through a proven track record of a projects revenues.
Electricity generation stability *annual power generation GW/h, MW/h*	Weather fluctuations are a source of uncertainty surrounding solar, wind and hydroelectric power projects. Though predictions of weather conditions and their implications for electricity output are increasingly reliable, performance data of a project's generation stability can help boost investor confidence.
Price competitiveness: cost versus incumbent technologies *cost differential with incumbent technologies; prevalence and levels of fossil fuel subsidies*	Blended finance interventions may initially be justified on the grounds of correcting market failures that artificially boost the competitiveness of incumbent technologies, for example fossil fuel subsidies. As this gap closes over time, blended finance should be reduced and make way for commercial finance.

Monitor and evaluate development impact

Utility-scale renewable power generation will often be a central pillar of a country's development strategy, supporting both social and economic development. It may be explicitly linked to an industrial strategy that aims to increase manufacturing capacity, either within the renewable energy sector (for example, developing local manufacturing capacity of wind turbine components), or to support the growth of wider sectors (for example manufacturing). Higher shares of renewables generation will also be critical to decarbonisation efforts, not only through direct emissions abatement, but also by supporting wider electrification, including of heating and transport (alongside wider zero emission heating and transport technologies). Possible development impact indicators for utility-scale renewables projects are set out in Table 3.6, below.

Table 3.6. Indicators to monitor and evaluate development impacts from blended finance interventions to support utility scale renewables

Indicator	Rationale
Health and social *air quality; health indicators*	Investments in power generation can significantly improve social, health and economic outcomes. Incumbent energy sources, including diesel generators are associated with significant negative health impacts, disproportionately impacting women and children.
Economic *MW/h of additional electricity capacity; jobs created (direct and indirect); new electricity connections to firms*	Increased renewable power generation provides significant economic benefits by supporting commercial enterprises, the deployment of other economic infrastructure (such as telephone and internet connections), and industrial development.
Emissions reduction *t of CO_2*	Electricity generated from renewables is in most cases a part of a diversified energy strategy that remains dependent on fossil fuel power generation. Though foregone emissions should not be counted as part of a country's emissions reduction targets, measuring the alternative is a major determinant of the climate impact potential of renewable energy projects. Over time, renewables generation needs to be scaled up to bring fossil fuel generation offline.

Other clean energy and integration

Investment in a number of other clean energy technologies beyond renewable electricity and energy efficiency will also need to be rapidly scaled in order to transition the energy system, including the hard to abate industry and transport sectors, on a pathway consistent with the Paris Agreement goals. Other clean energy and integration technologies required to meet a net zero pathway include green hydrogen (produced from renewable power), carbon capture utilisation and storage (CCUS) technologies, and renewable integration technologies such as energy storage.[13] Renewable fuels and renewable heating and cooling are also important solutions for the clean energy transition. In the case of renewable fuels, access to commercial finance is not typically a major barrier and challenges are often linked to broader

[13] While nuclear may also be a key part of a country's transition strategy, its financing is expected to continue requiring a large public element in all geographies; it is therefore beyond the scope of these guidelines, given their focus on blended finance that implies an end-goal of full commercial financing.

sustainability issues, while renewable heating and cooling technologies face similar barriers to other clean energy technologies covered in early sections.

The continued use of fossil fuels (particularly coal) for power generation in many emerging and developing economies (EDEs) in addition to the need to address industrial process emissions, makes CCUS technologies a critical solution and one that will need to focus across capture, transport and storage infrastructure. With some of the lowest renewable electricity costs in the world and high resource potential in many EDEs, the deployment of green hydrogen technologies in these countries could lead to an even faster reduction in technology costs and provide for additional options to lower emissions (in the steel and chemicals sector or to displace diesel generators with solar powered hydrogen fuel cells) and helpful to reach net zero by mid-century.[14] Energy storage technologies can allow for greater integration of variable renewables such as solar PV and onshore and offshore wind. Distributed solar with batteries can provide remote areas with dispatchable power providing electricity 24 hours a day. While blended finance may not be suited to manage early technology risks, the following section will outline the market failures and investment barriers that could be addressed by blending for these three clean energy technologies.

Sector-specific market failures, risks, and other barriers to investments

- Externalities: Lack of a carbon price at an appropriate level in emerging and developing economies makes the business case for CCUS unattractive. Without the ability to adequately value or price the carbon reduction achieved from applying carbon capture technology, commercial finance for CCUS will remain unavailable. Unlike other clean energy technologies, carbon capture generally leads to much higher costs without any revenue benefit unless the CO_2 can be monetised as offsets, or sold and used elsewhere (for enhanced oil recovery, or as a chemical feedstock to produce green H2 or the beverage sector) although the scale of capture needed to mitigate emissions far exceeds current possible uses for the carbon.
- Revenue uncertainty: Appropriate business models for energy storage may be inadequate on their own to support investments, as in many electricity markets, there are limited clear compensation models for the multiple services that energy storage can provide. For CCUS, the complexity of value-chains, with several different actors and business types, means that some actors carry significant “cross-value-chain” revenue risk (as they are dependent on other actors further up the chain).
- Information asymmetries: Performance of new technologies in new markets also suffer from inadequate performance data for financial institutions to perform risk assessments, and data provided by developers in feasibility studies may differ from actual performance depending on the skills of the developer. The lack of reliable data on project performance can hinder market development and lead to higher financing costs or absence of commercial finance. As relatively new technologies in emerging and developing economies, green hydrogen, CCUS, and energy storage technologies lack local performance data to fully assess risks and returns, and will require public support to establish new business models for their development.
- High overall capital requirements: CCUS projects tend to be large and capital intensive, with high-perceived risks, which are key barriers to investment. The ability of firms to access financing for such projects could prove to be particularly challenging without either direct government support or regulation that allows firms to monetise the value of investing in CCUS technology. In the case of green hydrogen, achieving adequate scale to drive costs down, as well as justifying investments in related infrastructure will require large capital outlays and uncertainty around future demand for green hydrogen is a barrier to investment. This is also the case for large scale batteries.

[14] A forthcoming working paper on “Green hydrogen opportunities for emerging and developing economies – identifying key success factors for market development and building enabling conditions” will be released later in 2022.

- Foreign exchange risks: New technologies and a high share of imported equipment, at least in the early market phase, requires foreign exchange hedging that can lead to prohibitively high financing costs. While international lenders may have more experience financing green hydrogen, CCUS and energy storage projects, and may be more willing to take technology risks in a new market that domestic lenders may be unwilling to cover, this can expose them to currency risks.
- Supply chain risks: The availability of critical minerals such as lithium, cobalt and nickel can pose barriers to investments in battery storage.

Choosing financial instruments while minimising concessionality

- Revenue guarantees: In the case of CO_2 transport infrastructure financing, revenue guarantees that provide some certainty on usage can be used during the creation of clusters to localise projects in a way that creates adequate demand for transport infrastructure. Risks associated with project delays can be covered under guarantees to help reach the necessary scale and demonstrate business models. Co-ordination across different CCUS actors is important to ensure that transport and storage infrastructure is available when capture technologies have been installed. Similarly, for energy storage, revenue guarantees can be used to cover any shortfalls between the projected revenue needed to cover the financing costs of the project and actual revenues and help to address revenue uncertainty risks and lack of data for project evaluation.
- Partial risk sharing or first loss facilities: As new (green hydrogen and CCUS) or less widely adopted (energy storage) technologies in emerging and developing economies, commercial finance may not be available to fund early-stage market development due to a lack of operational data in local markets and unfamiliarity with the technologies. Partial risk sharing or first loss facilities could be used to establish market confidence and a track record that can crowd in commercial finance. These instruments can also be used to address supply chain risks.
- Viability gap funds: Viability gap funds are used to support new technologies under public-private partnerships to meet affordability and commercial return expectations. Concessional funding for first projects can allow them to proceed, establishing market viability and help drive future cost reductions as technologies scale. In the case of green hydrogen, deployment and later local manufacturing of electrolysers in emerging economies would help to achieve faster cost parity with fossil fuels, as these markets have much lower renewable electricity costs and a higher potential for economy of scale benefits alongside high projected electricity demand.
- Foreign exchange guarantees: Foreign exchange guarantees can help to shift foreign exchange risks from smaller actors to larger dedicated facilities that are more capable of taking on and managing them. The currency exchange fund, TCX, and currency hedging facility, MFX, for example, are two specialised entities that provide foreign exchange hedging. TCX is backed by a number of multilateral and bilateral development finance institutions and bilateral donors and uses a diversification model to pool and cover different currency risk. MFX is backed by guarantees from the US and the Netherlands and provides hedging instruments to different development finance institutions.

Determine target mobilisation

For technologies such as green hydrogen, CCUS and energy storage, interventions should focus on establishing market viability, demonstrating business models and building confidence among investors. Bringing in commercial finance to the first projects should be the primary target and a certain level of concessionality may be required to lower financing costs to enhance project economics.

In the case of green hydrogen development, support to establish local manufacturing of electrolysers in markets with adequate domestic or regional scale, manufacturing know-how and either local manufacturing

of or access to components (as in Egypt, India, and Thailand), can help to drive costs down and create local benefits. The deployment of green hydrogen will be targeted at industrial (steel, petrochemicals, fertilisers and in refineries) and transport sectors (road freight and shipping) and to facilitate integration of low-cost renewables, where access to commercial finance is less constrained. In these circumstances, the use of concessionality should be kept to a minimum and blended finance interventions should focus on de-risking through guarantees and other interventions versus provision of concessional finance.

Energy storage solutions will need to be deployed at both the utility-scale for greater integration of variable renewables and for mini-grids and small-scale individual systems. The use of concessional funds will be more suited to the latter, where access to commercial finance is more constrained. At the utility-scale level, a stronger focus on policy and regulation will have a larger role in mobilising private capital. As with green hydrogen, the opportunity to support the establishment of local manufacturing for batteries in countries with sufficient domestic or regional scale and access to inputs could also be a consideration at the country and sector level, for example, through Indonesia's strategy to become a battery manufacturing hub in ASEAN given its resources of rare earths (a critical component in the manufacture of batteries) and strategic location. While the battery strategy is currently focused on the EV market there will be important spill overs across sectors that through a single technology could support multiple markets.

Given the scale of capital required to finance investments in green hydrogen, CCUS and utility-scale energy storage, domestic and international public finance institutions will need to work closely with major domestic and international financial institutions active in the target country to establish suitable implementation channels. Public-private partnership models can also be explored to allocate risk most appropriately between different financial actors to increase the mobilisation potential.

Co-ordinate the intervention with the ecosystem

The development of blended finance interventions for newer technologies should strive to integrate financing strategies as part of national roadmaps that are often developed at the country level to guide market development. Close co-ordination is needed with the government, private sector and various development partners looking to support countries in the development and deployment of these technologies. For large scale battery development, close co-ordination will be needed with the power sector, including the electricity regulator who will determine the business case for storage. In the case of CCUS, co-ordination will be needed with transport and storage developers as well as power sector and different industry subsectors such as cement, steel, and chemicals. Different financial actors from local and international banks, export credit agencies, development finance institutions and insurance companies will likely be part of the CCUS financing ecosystem.

The ecosystem for green hydrogen is also very diverse and includes similar actors on the financing side as for CCUS, while the hydrogen value chain includes renewable power developers, utilities, green hydrogen developers, gas companies, and the steel and chemical sectors. While blended finance interventions for green hydrogen should focus on where the business case for development is closest to commercial maturity, co-ordination nonetheless with the entire hydrogen value chain will be important or long-term sustainability and development of the market as developments are likely to be interlined across different sectors. Co-ordination at the international level will also be important as the global market for green hydrogen is likely to be interlinked across different national and regional markets.

Exit once commercial markets are functioning

Determining when to start to phase out or terminate public support for a new clean energy technology will require close monitoring of market developments. It is difficult to determine exactly how many transactions or how much capacity needs to be deployed before commercial markets are established. This will also be impacted by global developments. Signals that commercial viability is approaching include reductions in

the cost gap with incumbent technologies, rapid growth in market share and the number of active project developers. Table 3.7 sets out a number of indicators that can be used to assess the development of new clean energy markets and evaluate readiness to phase out public support.

Table 3.7. Indicators to support decisions on exiting blended finance interventions in other clean energy technologies and integration

Indicator	Rationale
Number of transactions	For interventions aimed at demonstrating technology viability in a new market or establishing suitable business models, placing a limit or setting a goal on the number of transactions may be appropriate to determine a suitable end or exit.
Scale targets *MW or GWh or tCO_2*	Similar to fixing the number of transactions, establishing a target amount of capacity could also be used to determine when to exit.
Cost targets *$*	Declining equipment or installation costs are a strong signal of market creation. Setting cost targets or monitoring for signs of cost reductions can help to signal an appropriate time for exit or evaluation of programmes.
Cost parity with incumbent technology *%*	Monitoring cost differentials with incumbent technologies can signal when deployment levels of clean energy technologies are reaching maturity.
Penetration rates *market share % or capacity utilisation*	Determining a target penetration rate based on market share of new installations or capacity utilisation (in case of carbon transport and storage infrastructure) can be an option to determine when a market has reached sufficient maturity.
Project replication without support *Y/N*	Existence of project replication without the need for public interventions is a clear sign that the market is ready to drive development, and is a strong exit signal, while the absence of market interest without sustained support could indicate that significant risks and barriers remain.

Monitor and evaluate development impact

The development of green hydrogen, CCUS, and energy storage will lead to broader development benefits. These include increased employment, emissions reduction, provision of carbon-free electricity 24 hours a day, and the retirement of dirty and expensive diesel generators. Below is a non-exhaustive list of possible indicators for monitoring and evaluating the impacts of blending interventions supporting energy efficiency and energy conservation measures (Table 3.8).

Table 3.8. Indicators to monitor and evaluate development impacts from blended finance interventions for other clean energy technologies

Indicator	Rationale
Emissions reduction *t of CO_2*	Green hydrogen, CCUS and energy storage will all have significant emissions reductions either through direct CO_2 abatement (CCUS) or through the displacement of fossil fuels (green hydrogen and energy storage) and related emissions.
Number of direct jobs created	The development of green hydrogen will increase renewable investments and related jobs for the installation and maintenance of renewable power plants, which are more employment-intensive than fossil fired generation. Wide adoption of battery storage could create sizable domestic markets and the localisation of manufacturing capacity in certain countries. CCUS development will require investments in transport and storage facilities that will have direct employment benefits in the short (construction) and long (operation and maintenance) term.
Renewable energy integration *GWh*	Energy storage technologies such as pumped hydropower and large-scale batteries can facilitate the integration of variable renewables and displace fossil fueled generation. This reduces CO_2 and other greenhouse gas emissions, and results in improved air quality and health outcomes.
Additional hours of emissions-free electricity provided *hours*	Improved electricity access through the provision of additional hours of emissions-free power via battery storage or stationary fuel cells from solar electricity allows for renewable power provision 24 hours a day.
Retirement of diesel generators *MW*	Diesel generators are highly polluting and, while cheap to purchase, run on expensive, often imported fuel. This fuel often needs to be transported long distances leading to additional transport emissions. Savings from reduced imports of fuels can be invested in the development of other economic activities.

Annex A. Case studies

The following case studies have been provided by development practitioners and demonstrate real-world application of some of the considerations outlined in this paper. The OECD's Clean Energy Finance and Investment Mobilisation programme will continue to work with donors, beneficiary governments, international organisation, and the private sector to develop a repository of further case studies to promote sharing of lessons-learned on blended finance for clean energy. These can be accessed on the OECD's website.

Pro Mini-Grids Programme, Uganda – Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Project overview and objectives

The Pro Mini-Grids programme was launched in Uganda in 2017 as a pilot project funded by the Government of Uganda with support from the German Federal Ministry for Cooperation and Economic Development (BMZ) and the European Union. The Ministry of Energy and Mineral Development, the Rural Electrification Programme, the Electricity Regulatory Authority, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) implemented the programme.

The Pro Mini-Grids pilot aimed to provide power to up to 15 villages in the south of Uganda and 25 in the north, using an integrated procurement framework. This development programme supported the government of Uganda in bundling multiple mini-grid sites into single tenders to create a larger ticket size for investors to pursue. The programme also worked with relevant agencies to increase their capacity to procure mini-grid projects, and to streamline project development by pre-preparing government contracts. The programme also provided partial subsides on capital expenditures for generation assets (GIZ, 2020[30]).

This enabled the Government of Uganda to launch two rounds of calls for proposals for procurement under Build-Own-Operate-Transfer (BOOT) contracts with a concession period of 10 years. Winch Energy, an off-grid energy developer and technology designer won both tenders, the first in 2017 and later in 2021.

Identifying the market failure, risks, and barriers to commercial investment

The integrated approach aimed to help scale project development to address barriers to finance and project development risks. The small and disaggregated nature of projects, in particular, creates challenges to mobilising investment at suitable scale to meet electrification targets. By bundling projects into two multi-site tenders, each with a single contract, a larger developer was able to enter the market and raise equity and debt for a larger project, whilst also benefiting from economies of scale on project costs.

Transaction costs are also a significant barrier for small mini-grid projects. This includes the costs of individual site tendering, which requires developers to dedicate time and resources towards preparation of documentation and engagement with various authorities. Under the integrated approach, the developer contracts and agreements were pre-drafted and financing mechanisms both grant- and results-based were determined in advance.

While the Government of Uganda had developed a Minigrid Regulation in 2020, the project development phase still bears a number of risks and uncertainty pertaining to government licencing and approval

processes. These risks are particularly important as they concern unrecoverable planning costs if the project does not go ahead. These risks were reduced by involving the regulator in the tender document preparation, as the regulator has the final responsibility over issuing licenses, approving and setting tariffs, and overseeing technical standards.

Early arrival of the grid also presents risks for mini-grid projects. The involvement of the regulator and the electrification authority under this programme allowed for sites to be selected in alignment with national grid extension planning under the rural electrification master plan, and clear conditions and compensation were established in the case of early connection to the national grid.

Finally, cost recovery through tariffs remains a key concern, given the low income of users and therefore their often inability to pay for services. Under the Pro Mini-grids model, developers were asked to calculate the level of subsidy on the capital costs of generation needed to operate under a fixed tariff of 0.29 USD/kWh set by the regulator based on customers' ability to pay (GIZ, 2020[30]).

Choosing the financial instrument

Typically, renewable mini-grid access projects are dependent on some form of subsidy to account for the high upfront capital cost and the low ability to pay of consumers. Countries tend to adopt a subsidy on the tariff to allow developers to recover operations and maintenance costs, an initial grant to cover the capital costs of generation, or both types of subsidies combined. Under the Pro Mini-grid programme, the choice was made to support project development with subsidies on upfront capital expenditures set as a proportion of the total installed capacity rather than incur an ongoing cost for government on subsidised tariffs. The programme also took a results-based approach to disbursing subsidies in order to catalyse more private investment.

Under this model, Winch Energy was eligible to receive a subsidy of up to 80% of the total upfront capital cost including generation and distribution infrastructure and connections. Within this, the Electricity Regulatory Authority provided distribution infrastructure as an in-kind contribution. GIZ then provided a subsidy of up to 70% of upfront capital cost of generation assets disbursed based on milestones and results. Example milestones included completed assembly and shipping of mini-grids, construction of mini-grids in the villages, and customer connection and access to electricity supply. The mini-grid developer initially paid for customer connections and were reimbursed under a results-based approach after the connections were made and verified to be compliant with regulatory requirements (GIZ, 2020[30]).

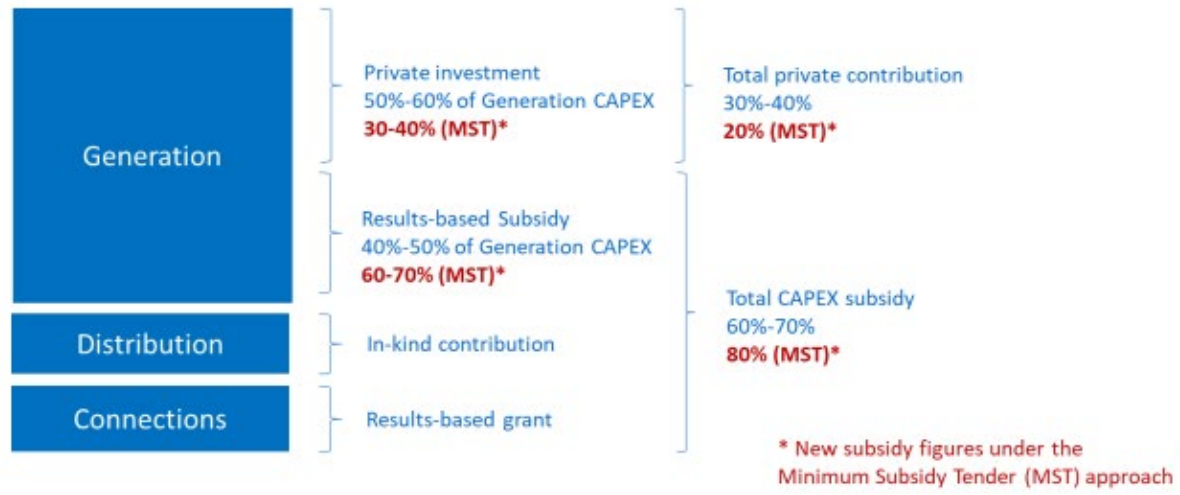
The developer, Winch Energy, raised finance for the first 25 projects in the Lamwo region of Northern Uganda, by further aggregating these with 23 projects awarded in a tender in Sierra Leone in the districts of Tonkolili, Koinadugu and Bombali. The developer established a dedicated financing vehicle, with NEoT Offgrid Africa to mobilise USD 16 million for both projects. This included USD 12 million of equity from both partners and USD 4 million from a syndicated facility between FMO, the Dutch entrepreneurial development bank and the Renewable Energy Performance Platform (REEP).

For projects in Uganda, Winch Energy mobilised a further USD 2 million loan from SunFunder, a financing company dedicated to solar energy in emerging markets, to act as a bridge loan until reaching milestones where subsidies for upfront capital cost of generation assets were disbursed.

Determining target mobilisation

The programme aimed to mobilise private investment for 50 – 60% of the capital costs of generation, which accounts for 30 – 40 % of total capital expenditures on the generation, distribution, and connection costs. However, tariffs calculated by bidders to recoup their costs, of around 0.50 USD/kWh, were deemed too high for customers, and the government set a tariff level of 0.29 USD/kWh. In order to help developers achieve this, the level of subsidy on the capital costs of generation was increased, and final private contribution on the generation, distribution and connection costs amounted to 20%.

Figure A A.1. CAPEX financing structure of the *Pro Mini-Grids programme*



Source: GIZ

Co-ordination and governance

This project was the result of significant collaboration between GIZ and various entities within the Uganda government, notably the Rural Electrification Programme and the Electricity Regulatory Authority, under the policy direction of the Ministry of Energy and Mineral Development. The Electricity Regulatory Authority was responsible for issuing licenses, approving and setting tariffs, and overseeing technical standards to be published in the call for tenders to ensure projects were licensable upon selection of a developer. It also regulated the conditions under which a mini-grid could be connected to the national grid. On the other side, the Rural Electrification Programme's mandate in developing the electrification master plans enabled it to optimally designate potential mini-grid locations. It was also responsible for implementing rural electrification strategies, funds, and policies, therefore hosting the tendering process and determining financing mechanisms.

Monitoring, evaluation, and exit

A key objective of this design was to reduce preparation time for future mini-grid project development. The first tender process took 18 months as all tender documents, contracts and agreements had to be developed for the first time. However, the second tender took only six months as all documents and contracts and agreements were already in place, demonstrating positive outcomes in terms of streamlining licencing.

Through this process, government authorities have gained familiarity with the mini-grid project developments and the type of requirement international lenders prefer to include in contracts, for example around compensation of early grid arrival and recourse to international arbitration. Equally, lenders and developer have gained experience on the Uganda market. Notably, Winch Energy is now collecting market data on the mini-grids installed in the 25 villages in the north of Uganda, allowing it to better assess and provide evidence to lenders on potential energy consumption for future projects.

Moving forward, GIZ suggests that larger tickets sizes, of 50 to 100 projects would further increase project attractiveness to lenders, enable economies of scale for large developers and potentially allow for lower upfront capital subsidies.

Energy Efficiency and Conservation Financing Promotion Project, Bangladesh – Japan International Cooperation Agency (JICA)

Project overview and objectives

The Japan International Cooperation Agency's (JICA) Energy Efficiency and Conservation Financing Promotion Project in Bangladesh is designed to promote energy savings for industry and other economic activity, including the commercial buildings and residential appliances sectors. The project provides incentives to private firms to install updated energy efficient equipment to their production systems. The project is a partnership between JICA and the Government of Bangladesh (GoB), specifically the Bangladesh Sustainable and Renewable Energy Development Authority (SREDA), the Bangladesh Infrastructure Finance Fund (BIFFL) and the Bangladesh Infrastructure Development Company (IDCOL).

The project aims to nurture market development for energy efficient equipment by providing access to public finance for industrial firms. The project aims to contribute to reduce Bangladesh's national energy intensity, measured as the ratio of total primary energy consumption to real GDP. The project aims for a 20% improvement by 2030 compared to 2015, reflecting Bangladesh's Energy Efficiency and Conservation Master Plan (SREDA Power Division and JICA, 2015[34]).

Identifying the market failure, risks, and barriers to investment

Energy efficient equipment is more expensive than conventional equipment. Though the difference of initial costs is recouped through energy savings and lower bills over time, high initial costs create burdens to industry owners, limiting the viability of purely commercial financing.

In perfectly competitive markets, energy efficient equipment is utilised less than the optimal amount due to its positive externalities, in the form of cleaner air and lower greenhouse gas emissions. These are not fully internalised by the purchaser of the equipment, resulting in sub-optimal investment in efficiency in purely commercial settings. Subsidised energy prices in Bangladesh further exacerbate this market failure. Furthermore, there are information asymmetries on the latest available energy efficient technologies as a result of extant trade barriers. Most energy efficient equipment is developed and marketed for industries in developed countries, and therefore producers in Bangladesh have limited access to the information on their utility and applicability. Bangladesh's Energy Efficiency and Conservation Master Plan up to 2030 highlighted the incentive program to promote energy efficient equipment as one of key actions to address these market failures.

Choosing the financing instrument

JICA is providing loans to the Government of Bangladesh in two phases (including the cost for consultancy services):

- Phase 1: JPY 11,988 million (approximately USD 87 million; 0.01% interest rate, 40-year tenure with 10-year grace period)
- Phase 2: JPY 20,076 million (approximately USD 145 million[15]) 0.90% interest rate, 30-year tenure with 10-year grace period).

The process is designed as a two-step loan (TSL): JICA provides finance to GoB institutions (IDCOL and BIFFL), which is then lent to private sector end-users (sub-project owners). The typical terms of the loan from IDCOL/BIFFL to the end-users have a 4–7% of the interest rate and repayment period up to 10 years. These loans are only eligible for the procurement of eligible energy efficient equipment.

[15] At exchange rates on 22/08/2022.

Sub-projects are assessed for their eligibility for financing based on a Business Process Manual, as well as a pre-defined list of eligible equipment from which applicants can choose the financeable equipment. If a sub-project includes components that are not eligible for financing from JICA (for example, building/expanding factories, or auxiliary equipment) the partner financial institution, IDCOL/BIFFL, helps applicants arrange commercial finance to be blended with JICA finance to complete the sub-project.

Investment in efficiency is often dependent on parallel investment in conventional equipment and construction. The project therefore takes a tailored financing approach, whereby investment in energy efficiency is supported directly with loans financed by the project, whilst indirectly helping to mobilise wider associated investment (for example construction and renovation of buildings) through commercial channels, supported by the Government of Bangladesh.

Co-ordination and governance

SREDA is a government entity responsible for promoting renewable energy and energy efficiency in Bangladesh, and is responsible for the project's technical aspects, including sub-project eligibility. IDCOL and BIFFL are responsible for the financial process. Industries that are interested in securing project loans consult with IDCOL or BIFFL, who share technical information with SREDA, which then checks the technical eligibility. SREDA then issues a no objection certificate for the lending procedure.

JICA also provides technical assistance to SREDA to support capacity building for the operation of the project, as one of SREDA's major policy programs. Specifically, the technical assistance supports SREDA through learning on energy efficient technologies, establishing procedures for energy audit, monitoring energy saving impacts and calculating intensity improvement, and to create a platform within SREDA with business and academia active in energy efficiency.

Monitoring, evaluation, and exit

For each sub-project, a periodical energy audit is carried out to confirm that energy efficiency of production (energy consumption / output) has improved, comparing to the status before the installation of the energy efficient equipment under the project. In addition, sub-project owners report energy and production data online quarterly.

Regional Energy Efficiency Programme (REEP), Western Balkans – European Bank for Reconstruction and Development

Project overview and objective

The Regional Energy Efficiency programme (REEP) was established in 2012 as a joint collaborative programme between IFIs (EBRD since 2012, KfW since 2017), the European Commission and bilateral donors under the Western Balkans Investment Framework (WBIF). It is implemented in close co-operation with the Energy Community Secretariat (EnCS). The overarching development objective has been to promote a sustainable market for energy efficiency in the Western Balkans, compliant with the requirements of the Energy Community Treaty.

REEP's operational model successfully blends IFI financing with EU and bilateral donor grants to offer an integrated package of targeted policy dialogue, technical assistance, and financing facilities deployed both directly and through local partner banks. This allows for the delivery of a full-rounded package while targeting a range of sectors (commercial, residential, public) and project types. This integrated approach leverages reforms in the sector whilst providing at the same time targeted finance to stimulate sustainable growth.

The programme further contributes to catalysing the market for residential energy efficiency investments; the expansion of markets for green technologies; demonstration of new replicable behaviour and activities; and transfer and dispersion of skills, including for local partner banks, homeowners and within technology supply chains (producers, vendors and service providers).

To date, the programme has successfully deployed successive rounds of funding and has evolved in scope to address emerging needs across sectors. The programme has reached a cumulative signed volume of EUR 297 million in credit lines and EUR 143 million of direct lending to private and public projects, thus supporting over 1000 SMEs, 12,700 households, and 290 public buildings in 700 cities and towns across the region. As of mid-2022, the mitigation impact of the underlying portfolio amounts to 842,000 MWh/year energy savings, 540,000 CO_2/year avoided and 120 MW new renewable energy capacity installed.

Identifying the finance gap, market failure(s), risks and barriers to commercial investment

The region is characterised by relatively high energy, resource and carbon intensity. High early-adoption costs for green solutions, low awareness of market participants of the benefits of green investments, lack of capacity with energy and resource efficiency technologies and lack of effective regulatory frameworks obstruct energy efficiency progress, particularly in the residential sector.

Market barriers, in particular affordability constraints, have become more prominent as a result of macroeconomic developments and local consequences of the heightened geopolitical risks. That is why, it is inevitable to keep accelerating public, private and residential investments (both for refurbishment and for new construction), supported by grant and concessional elements.

The decarbonisation and green transition of the buildings sector remains a large challenge in the region. This is evidenced by considerably low green technology penetration ratio due to persistent market barriers (affordability constraints, lack of effective regulatory implementation and low awareness of green investment in the market).

Blended finance is needed to mitigate the risks for first movers and incentivise them to invest in higher performing buildings and technologies that meet higher energy performance standards. Incentives are also needed to stimulate investments and contribute to accelerating the pace and depth of energy efficiency renovations in the region. This would be a much slower process only through pure public or commercial financing schemes.

REEP introduces innovations in the markets by promoting higher performance standards and practices currently not pursued widely in the Western Balkans 6 economies. Specific innovative aspects include:

- Promoting a new business model to enable energy retrofit of residential buildings via public intermediaries where municipalities, municipal district heating companies or dedicated buildings maintenance companies act as an aggregator for investments in the residential sector leveraging on the buildings maintenance and/or district energy supply contracts already in place between the parties. In that way, these public entities act as implementing agents for energy efficiency projects. This model has already been successfully tested in a medium town in Serbia with EBRD with a significant demonstration and replication potential.
- Promoting high performing new constructions beyond national regulations.
- Promoting investments in renewable heating and cooling technologies through financing of integration of renewable technologies (especially heat pumps, solar thermal and geothermal) into district heating systems. This contributes to establishment of a new market for renewable district energy in the region, which currently does not exist.
- Introducing digitalisation and innovative technologies in the built environment.

- As part of the next stage of the programme, it is planned that the REEP programme will devise a pilot scheme to support energy efficiency (re)developments of residential buildings by the private sector, including through conversions and/or extension of existing structures. While such (re)developments could be profitable and widely replicable, they are practically a novelty in the local markets.

Choosing the financing instrument

The EBRD undertook comprehensive market demand studies, considering technical, economic and behavioural perspectives of the residential buildings sector, to help identify barriers and analyse appropriate levels of financial concessionality. The Bank has further consulted its extensive network of partner financial institutions throughout the region, to help identify new market opportunities and understand the support needed to deliver financial incentives, which was entirely new for the financial sector at the time. Correspondingly, the REEP is an integrated programme combining policy dialogue, technical assistance, credit lines, incentives, and direct financing to SMEs and municipalities. Integrated credit lines extended through the Western Balkans Green Economy Financing Facility (WB GEFF) programme provide financing to local partner banks for on-lending to finance investments to private sector sub-borrowers in the residential sector. These are complemented by performance grants to sub-borrowers to incentivise early movers, help address prevailing market barriers and ensure the maximisation of energy efficiency impact from the portfolio of financed sub-projects. An integrated TA package supports local financial institutions with capacity building, awareness raising and knowledge transfer on green technologies.

The integrated approach offered by REEP allows not only for targeted finance, but also for tailoring adequate approaches to specific market contexts. For example, due to operational barriers faced by homeowners' associations, ongoing credit lines have not financed such associations despite the availability of a higher investment grant intensity. To address this specific market gap, the upcoming phase of REEP (2022-onward) will offer additionally tailored mechanisms to mitigate financial and operational barriers faced by these stakeholders, including through capacity building to narrow down the enforcement gap of energy performance certificate implementation in practice.

Determining mobilisation

Ultimately the REEP Programmes aim to contribute to the establishment of a self-sustaining market for sustainable energy finance for the private, public and residential sectors in the Western Balkans. The combined REEP programmes have been very successful in transforming market conditions in the region and in particular in developing and implementing related investments.

REEP's integrated package of targeted policy dialogue, technical assistance, and financing is proving to be a highly effective model, which leverages reforms whilst at the same time providing targeted finance to stimulate sustainable growth. The integrated approach employed by REEP deploys policy reforms to strengthen compliance with energy efficiency regulations and to support decarbonisation of the buildings sector.

Investment by households, corporates and municipalities are further supported through offering new financing instruments, such as innovative models for financing multi-apartment buildings through public intermediaries, financing schemes for sustainable heating and cooling and expanding existing instruments to new sectors e.g. retail and construction companies or to heating and cooling technologies in the public sector.

The "Technology Selector" component of the programme is an online list of high-performing technologies that have been assessed and pre-approved to meet minimum performance requirements and perform beyond current market practices resulting in clear benefits and environmental improvements. The list is

regularly updated to include the latest technologies and vendors, it also provides locations where listed technologies can be purchased. While as an initial step, these have been assessed and pre-approved for GEFF financial support, this platform serves as a publicly accessible point of refence with technologies increasingly financed by local banks outside of the programme too.

Coordination and governance

The REEP is co-ordinated through the WBIF governance framework, which includes: i) regular Board meetings with representatives from EU and bilateral donors, beneficiaries, IFIs, EnCS to monitor programme progress and determine strategic directions; ii) annual reporting to WBIF stakeholders; and iii) regular reporting to beneficiaries via the EnCS-convened Energy Efficiency Coordination Group. Furthermore, government institutions, international donors and other stakeholders are consulted during the preparation of the policy dialogue assignments, while investments with private financing institutions and public sector entities are discussed and structured in negotiations with the respective beneficiaries.

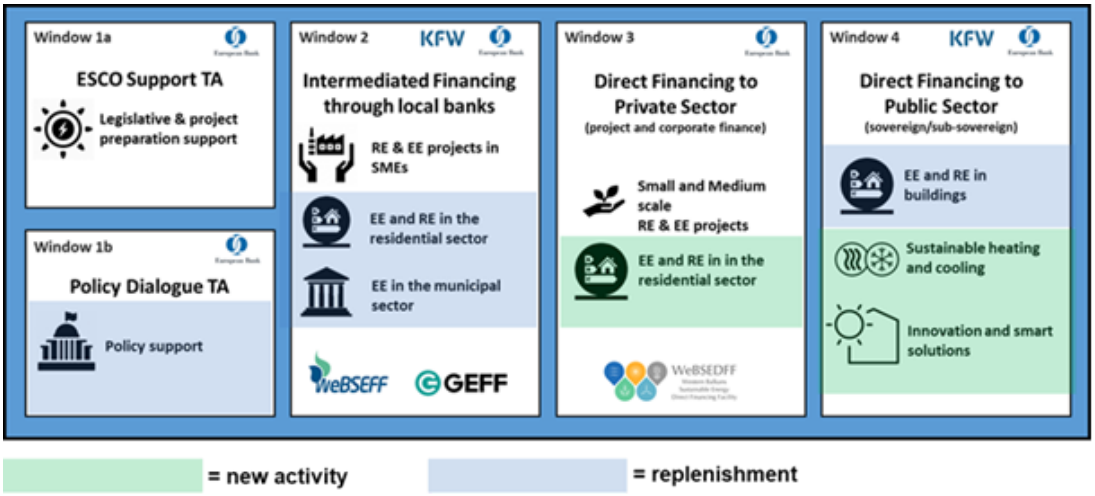
Monitoring, evaluation and exit

The EBRD has set up a robust measurement, reporting and verification (MRV) system, in line with internationally established practice. The system's guidelines define the characteristics of green projects and project components and they determine the data required for monitoring. For every green project, an estimate is made of the energy savings, renewable energy production, greenhouse gas emission reductions, water savings and materials savings or waste reductions. This information is tracked in the EBRD's MRV database and reported to the Bank's Board board of directors on a quarterly basis.

Specifically, the REEP programme's impact is measured along a comprehensive list of output and outcome indicators, including:

- Number of policy products prepared and delivered to target beneficiaries
- EUR on-lending via intermediated finance (through local partner financing institutions)
- EUR direct lending for public, residential buildings and sustainable heating and cooling
- Number of loan officers trained on green economy investments
- Number of end beneficiaries
- Expected primary annual energy savings (MWh p.a.)
- Expected annual carbon reductions (tCO_2 p.a.)
- Production of energy from renewables (MWh p.a.)

Figure A A.2. Project components



Energy Savings Insurance Program, Colombia – Inter-American Development Bank

Project overview and objectives

The Energy Savings Insurance (ESI) model was first developed by the Inter-American Development Bank (IDB) in 2014, with the support of the Basel Agency for Sustainable Energy (BASE), to drive investments in energy efficiency projects. It has since been implemented in eight Latin American countries for several sectors, notably healthcare, hospitality, agriculture and SMEs.

In Colombia, the ESI pilot program was launched in 2016 under the leadership of Bancóldex, a Colombian national development bank, with financial and technical support from IDB as well as the Climate Investment Facility's (CIF) Clean Technology Fund (CTF) and the Danish government. The program was expected to support 104 firms to reduce about 13,977 tonnes of CO_2 emissions annually through energy efficiency upgrades within five years of execution.

The ESI model is a de-risking package consisting of both financial and non-financial elements designed to build investor confidence in energy efficiency projects. It combines medium- and long-term credit lines with three risk mitigation instruments that support the identification and structuring of technically robust and bankable projects: a standard contract, technical validation, and the energy savings insurance.

The energy savings insurance product is purchased by energy-efficient technology solutions providers or energy service companies (ESCOs) to back the performance of their projects such that clients receive contractually guaranteed compensation if projected energy savings are not realised. The standardised performance contract and independent technical verification procedure are important complementary elements that reduce risks and transaction costs and enable the functioning of an energy savings insurance. Credit lines from national development banks provide long-term financing to reduce the cost of capital for energy efficiency projects.

Identifying financing gap

Energy-efficient technologies and equipment require higher upfront capital investments than conventional technologies, and returns on investment are obtained over time in the form of energy savings and reduced energy bills. Although these eventual savings can be used to repay debt obligation, local financial institutions lack the capacity to accurately evaluate creditworthiness of such projects. Thus, firms willing to invest in energy efficiency upgrades are unable to access long-term commercial financing at competitive rates. Given that most firms conduct business locally and in local currency, the credit lines should thus provide adequate rates in local currency.

The ESI program in Colombia channels concessional financing from IDB and CTF through credit lines specifically structured to suit energy efficiency projects, with features such as extended loan terms or grace periods and accounting for the monetary benefits from energy savings. Long-term concessional financing is channelled through Bancóldex to local financial institutions and eventually reaches investing firms. Further, the program builds capacity and experience of financial institutions to assess and approve energy efficiency loans, thus lowering their risk perception of energy efficiency projects.

Identifying the market failure, risks, and barriers to commercial investment

Lack of trust in the ability of energy efficiency upgrades to deliver promised energy savings is a key barrier to such investments. Since most technology solutions providers are unable to offer pay-per-use services, firms have to secure financing for capital-intensive energy efficiency projects on their balance sheet, thus bearing the entire downside risk if promised energy savings do not materialise. In this context, firms' lack

of awareness or confidence in the potential benefits of energy efficiency upgrades hinders the uptake of such projects.

The ESI model overcomes this trust barrier by implementing mechanisms to mitigate investing firms' downside risk. A standardised performance contract guarantees energy savings relative to a benchmark and an insurance mechanism covers the firm's losses in case savings is not realised. Further, an independent verification mechanism reduces information asymmetries and empowers investing firms with information about the project's technical robustness and energy saving potential, thus creating trust and facilitating investment decisions.[16]

Choosing the financial instrument

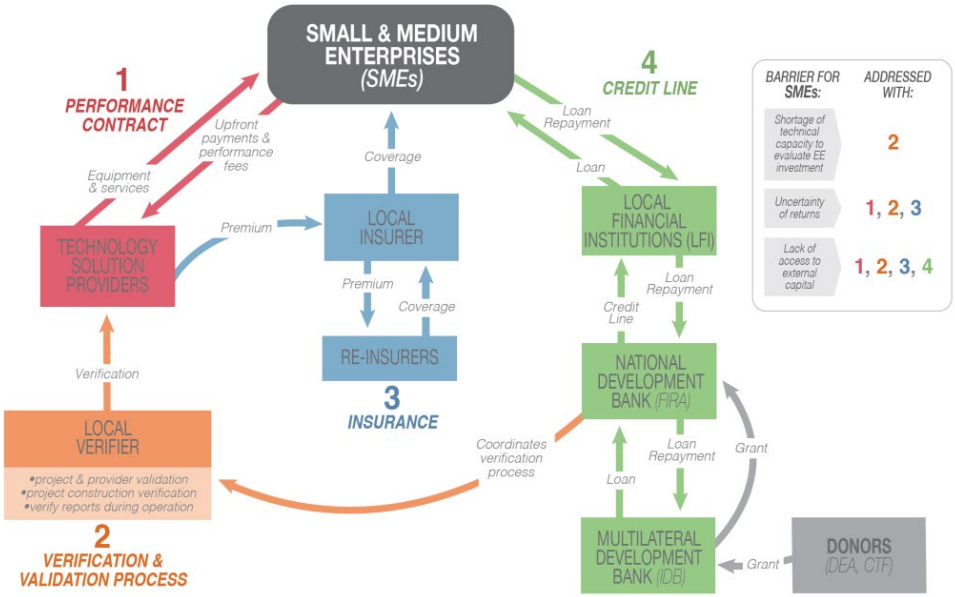
The financing strategy under the ESI model consists of four components, combining long-term financing with three risk mitigation instruments: a standard contract, technical validation, and the energy savings insurance.[17]

- The standard contract establishes the responsibilities of the supplier in terms of supply and installation of equipment, corresponding guarantees, and the promised energy savings relative to a benchmark (established by the supplier with standardized methodologies based on ISO 50001 protocols). It also commits the customer to timely payments, access to facilities, and adequate maintenance of the equipment.
- The technical validation is carried out by an independent validator who evaluates and confirms the project's technical potential to achieve the promised savings and verifies on-site that the project has been built according to specifications. The validator also acts as an arbitrator in case of disagreements between customer and supplier in terms of actual savings generated by the project. The validator's roles are defined in the standard contract and its decisions are binding for the parties.
- The energy savings insurance is a performance warranty provided by the supplier to the customer for the committed savings over the contract duration. If at any point in time the project does not achieve the pledged savings, the insurance will financially compensate the client. The energy savings insurance is activated upon technical validation of the project.
- Insured projects are provided credit lines at special conditions, including preferential rates, grace periods and extended tenure. Additional incentives are also provided to investors and technology providers, including free technical validation, specialised technical support, access to capacity building services, expedited credit evaluation, and preparation and dissemination of success cases in events and electronic platforms.

[16] https://greenfinancelac.org/wp-content/uploads/2018/04/IDB-CMF-ESI-Program-Toolkit-Version-1.0-1.pdf.

[17] https://greenfinancelac.org/our-initiatives/financial-mechanisms-for-sustainable-energy/esi-colombia/.

Figure A A.3. Project structure



Source: Climate Finance Lab, www.climatefinancelab.org/project/insurance-for-energy-savings/.

Co-ordination and governance

The ESI pilot program in Colombia was funded by IDB, CIF's Clean Technology Fund and the Danish government. Implementation activities was coordinated under the leadership of Bancóldex, a Colombian national development bank. IDB and Bancóldex jointly provided financial and technical incentives to investors and technology providers developing projects under the ESI model. SURA, a leading insurance company, pioneered the development of an energy saving insurance product in Colombia. ICONTEC provides its services as a technical validator for energy efficiency projects under the ESI model.

Monitoring, evaluation, and exit

As of May 2022, the ESI program in Colombia had facilitated investments worth USD 27.4 million across 212 energy efficiency projects spanning 171 firms in the services, commercial and manufacturing sectors. The program has also trained 35 technology solutions providers, developed validation guidelines for 12 technologies, and developed an online tracking tool in the process. The validation forms, methodological guidelines and other resources developed under the ESI program in Colombia now facilitate its replication in other countries.[18]

[18] https://publications.iadb.org/publications/english/document/Energy-Savings-Insurance-Standard-Platform-for-Structuring-Evaluating-and-Monitoring-Investment-Projects-in-Energy-Efficiency-and-Distributed-Generation-with-Guaranteed-Energy-Performance.pdf.

Scatec, MIGA and EBRD Green Project Bond in Benban Solar Park, Egypt

Project overview and objectives

The project involves the debt refinancing of six solar power plants located in Benban Solar Park, through the issuance of Green Project Bonds. Benban Solar Park in the Arab Republic of Egypt is one of the world's largest solar complexes, consisting of 32 solar plants, with a total generation capacity of 1465 MW. It is a critical component of the Egyptian government's ambitious Sustainable Energy Strategy for the period ending 2035, enabling the government to support its goal of generating 20% electricity from renewable sources by 2022. Benban is part of Egypt's Feed-in Tariff (FiT) programme, authorised by the Government of Egypt in September 2016, which reached financial close in October 2017.

In April 2022, Scatec and its partners refinanced the non-recourse project debt for six solar power plants, with a total capacity of 380 MW, that have been operational since 2019. The plants will provide an estimated annual electricity projection of 930 GWh, enough to provide energy to more than 420,000 households, avoiding 423,000 tons of CO_2 emissions per year. The project is underpinned by a 25-year power purchase agreement (PPA) with the Government of Egypt.

The refinancing was achieved through the issuance of a 19-year USD 334.5 million non-recourse Green Project Bond, supported by risk mitigation instruments from the Multilateral Investment Guarantee Agency (MIGA) and the European Bank for Reconstruction and Development (EBRD). This was the first private green project bond issuance in Egypt and the southern and eastern Mediterranean region and the first issuance of a climate certified bond in the Egyptian energy sector. It will allow the reduction of the project's financial costs, improving the overall financial viability, and generate cost savings to be shared with the Government of Egypt. The project will have positive signalling effects, encouraging the refinancing of other renewable energy projects in Egypt and incentivising a new class of private investors to adopt similar financial structures in other sectors.

Identifying the market failure, risks, and barriers to commercial investment

There is a lack of appetite from global institutional investors to invest in the financing of development and operation of renewable energy projects in emerging markets jurisdictions. An opportunity was identified in this project whereby the combination of risk mitigation instruments from MIGA and EBRD would lead to sufficient credit enhancement and ratings uplift that would be essential for attracting private capital investment.

Choosing the financial instrument

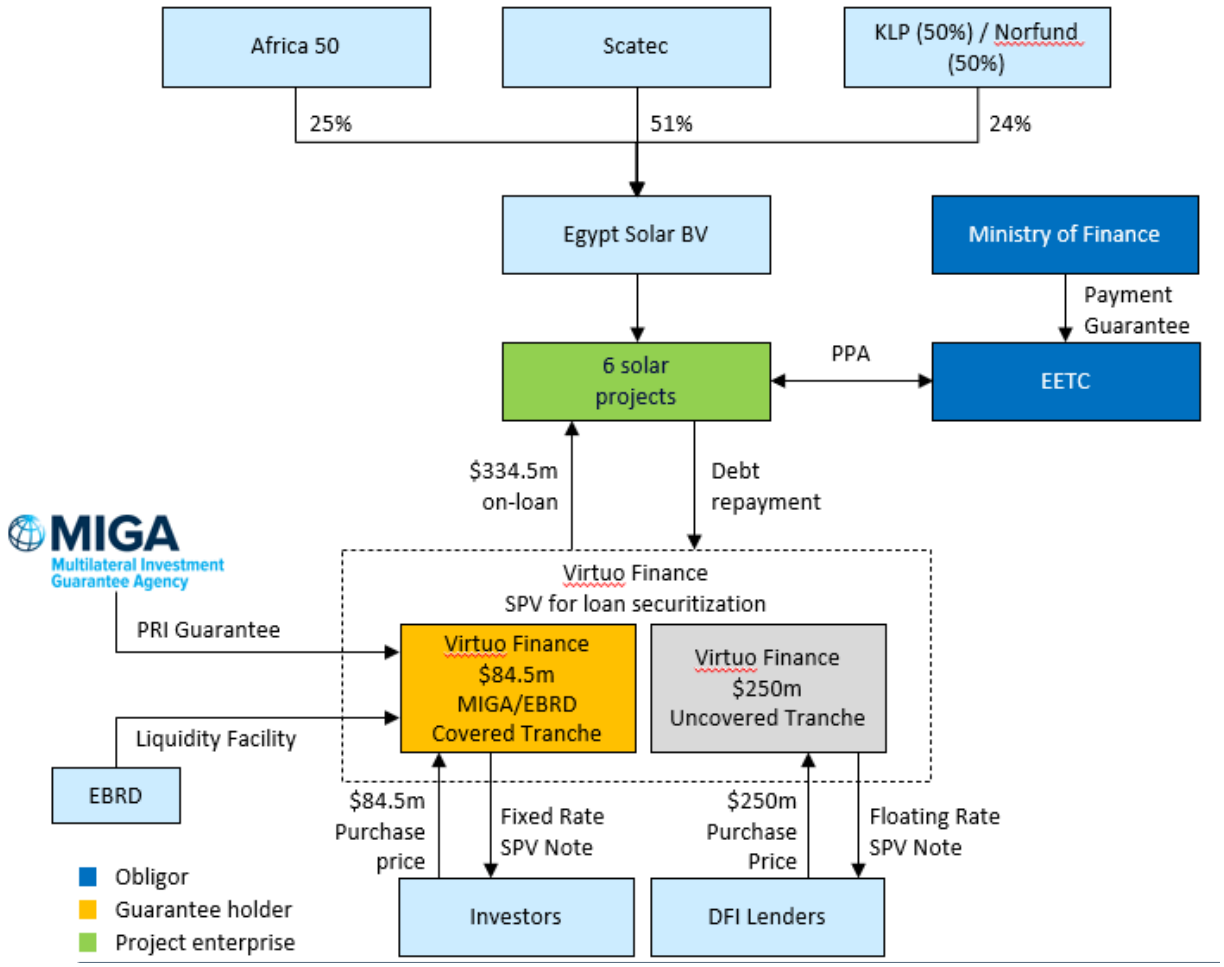
The transaction consists of the refinancing of six sub-projects' outstanding senior debt through the issuance of a bond with two tranches amounting to USD 334.5 million: (i) Tranche A, a fixed rate note to institutional investors; and (ii) Tranche B, a floating note to Development Finance Institution lenders including EBRD, DFC and FMO.

MIGA and EBRD worked together to create a credit enhancement mechanism for the project to address the risks to commercial investment. This was essential for attracting private capital investment, especially from major institutional investors who are mobilising investment contributions for the first time in Egypt.

Tranche A will benefit from MIGA's political risk insurance cover and a liquidity support facility provided by EBRD – which mitigates the risk of non-payment of debt service by the co-borrowers – thus enhancing the bond's credit and attracting a larger pool of investors. Tranche B will not benefit from the MIGA cover nor from the liquidity facility.

The proceeds from both tranches' issuances will be on-lent by the issuer to the six sub-projects as co-borrowers through a secured 20-year on-loan, matching the maturity of the bonds.

Figure A A.4. Scatec, MIGA, and EBRD Green Project Bond – project structure



Source: MIGA

Determining target mobilisation

Prior to the refinancing, the debt for the project was provided solely by development banks. A ratings uplift was necessary in order to attract private commercial finance. By providing political risk insurance, alongside liquidity support from EBRD, MIGA has helped to secure an investment grade rating of BBB+ – six-notches above Egypt's sovereign rating – from European credit rating agency Scope[19] on a climate bond being issued to raise money for the six targeted solar plants in Benban Solar Park.

Importantly, this rating upgrade is expected to send a positive signal as well as a model to countries as well as investors, helping motivate a new class of private institutional investors to adopt similar financial structures in other sectors.

[19] www.scoperatings.com/ratings-and-research/rating/EN/170521.

Co-ordination and governance

The project is the result of partnership between MIGA and EBRD, and sets an example of how multilateral and bilateral development financial institutions can work with client countries to deliver climate finance at scale. This partnership builds on the success of the previous such joint initiative of the two institutions in the Elazig hospital project in Turkey, wherein MIGA and EBRD had developed this risk mitigation structure[20] to support the project company in issuing green bonds in debt capital markets.

In addition, an independent verification was realised by DNV to assess the eligibility of the transaction with Climate Bond Initiative (CBI) certification for the green bonds. The CBI is based on Climate Bonds Standard 3.0 that focuses on projects that deliver greenhouse gas emissions reductions in line with the Paris Agreement, where the Transaction would fall under their solar criteria.

[20] www.ebrd.com/news/2016/unique-financing-model-as-ebrd-backs-elazig-hospital-ppp-project-in-turkey-.html.

Mobilising Institutional Capital Through Listed Product Structures (MOBILIST), ThomasLloyd Energy Impact Trust – UK Foreign, Commonwealth & Development Office

Project overview and objectives

Mobilising Institutional Capital Through Listed Product Structures (MOBILIST) supports investment through public markets to help developing countries achieve the Global Goals for Sustainable Development and climate transition. With the UK government's backing, MOBILIST deploys funds, conducts research and builds partnerships that direct capital towards environmentally and socially positive investment opportunities in African, Asian and Latin American developing countries.

MOBILIST aims to catalyse the institutional investment sector's deep pools of capital into developing economies, helping address the USD 4-5 trillion annual Sustainable Development Goals (SDGs) financing gap. FCDO research indicates that financial products listed on public capital markets offer the most effective route to attracting the large-scale volumes of high-quality and cost-effective institutional capital needed to bridge the financing gap. Presently, SDG-aligned emerging and frontier markets focused listed and public market intermediation mechanisms are almost wholly absent.

MOBILIST develops product pathways for institutional finance actors to unlock new profitable opportunities in emerging and developing markets. Creating attractive and sustainable pathways for capital in these markets directs funds to where they are needed most, helping fill the United Nations Global Goals financing gap.

MOBILIST supports fund managers and similar financial institutions who seek to list products dedicated to assets in ODA-eligible countries in major and local stock exchanges. MOBILIST sources investment proposals from the market that are backed by broker intermediaries and are assessed against the criteria of commercially viable, additional, replicable, scalable and feasible. MOBILIST supports selected products to list by investing equity on market terms and/or providing technical assistance. MOBILIST also supports its growing investment portfolio through research to support the programme's investment strategy and to identify and remove policy barriers to public markets mobilisation infrastructure.

MOBILIST's investment portfolio through their listing on public markets fosters publicly available price and risk information, allowing investors to better appraise and price the risk of developing country assets.

MOBILIST will leverage investment, technical assistance, research and communications to unlock the following impact and outcomes:

- Contribute to inclusive growth and productivity, job creation, climate resilience and decreased poverty.
- Increased supply of institutional capital for developing countries, resulting in higher levels of SDGs and climate-focused investment and capital accumulation.
- Improved enabling environment for public market mobilisation.
- Spurring replication of similar approaches and products to those supported by MOBILIST to increase the modalities for investment in developing countries.

Product

ThomasLloyd Energy Impact Trust (TLEI) is an investment trust vehicle focusing on sustainable energy infrastructure assets in renewable energy power generation, transmission infrastructure, energy storage,

and sustainable fuel production in fast-growing and emerging economies in Asia. The Investment Manager is ThomasLloyd Group (TLG),[21] a dedicated impact investor.

Meeting MOBILIST's criteria, as mentioned above, TLEI qualified for investment and support at Initial Public Offering (IPO) in December 2021.

- Scalable and Replicable: A pipeline of USD 750 million underpins TLEI's growth ambitions. This potential for scale corresponds with key market factors, such as the sustained growth of the renewable energy investment trust sector in OECD markets and the growing appetite for infrastructure financing in developing countries.
- Commercially viable: Targeted a net internal rate of return (IRR) of 10-12% net of all fees, expenses and taxes.
- Additional: The use of the investment trust structure – the underlying private assets that would otherwise not be easily accessible by most private investors – enables MOBILIST to stimulate capital deployment into these investments. It is also noteworthy that listing an emerging market-dedicated investment trust is challenging. TLEI delivers tangible additionality to the sector and the LSE marketplace, broadenening the investment offerings available to investors.
- Feasible: In addition to the geographical scope and the renewable energy assets alignment with development objectives, TLG's evidenced track record and pipeline as well as readily observable and continued demand from the private sector investors, demonstrates the feasibility of the investment product and the underlying assets.
- Credibility: TLG's strong track record, pipeline and seed assets transferred to the TLEI vehicle provide credibility that capital invested in this product will be used as intended.

A summary of the development impact assessment is set out in Table A A.1 below.

Table A A.1. ThomasLloyd Energy Impact Trust development impact assessment

Impact	Affordable and clean energy (SDG 7) • Carbon reduction • Equality and diversity	Decent work and economic growth (SDG 8) • Equality and diversity • Human rights • Health and safety • Bribery and corruption • Money laundering • Healthcare	Climate Action (SDG 13) • Carbon reduction • Biodiversity and land use • Water management
Primary routes	• Construct and operate a portfolio of renewable energy assets reducing carbon emissions • Reduce pollution to improve health	• Job creation within energy plants • Build resilience through supporting purposeful activity • Health and Safety legislation and policies to protect employees • Investment screening on corporate governance	Safe, resilient and inclusive cities (SDG 11) • Generate renewable energy to reduce carbon emissions • Investment screening on environmental criteria
Secondary routes	• Encourage foreign investment through supportive policy initiatives to support the transition to renewables	• Create a demand for new enterprises i.e. service provision to the plants or due to electricity supply • Creating secondary and tertiary employment opportunities	

[21] www.londonstockexchange.com/discover/news-and-insights/london-stock-exchange-welcomes-thomaslloyd-energy-impact-trust-plc-premium-segment-main-market.

While there has been an explosion of ESG funds and products over the past two years, these investments predominantly cover developed markets. For example, South Asia only receives 4%[22] of renewable energy investment. Although there are several listed products[23] for renewable energy globally and more covering OECD markets exclusively, TLEI is the first, and at the time of writing, still, the only Trust listed on the London Stock Exchange focusing on developing Asia, specifically outside China.

TLEI expects to create hundreds of jobs, improve energy access for nearly one million people in Asia and contribute to nearly 300,000 metric tonnes of carbon reduction per year. TLEI's objectives are centred on a 'triple return' on investment, which consists of environmental, social and financial returns. TLEI expects to improve job creation, electricity supply and carbon reduction for communities in India and the Philippines at first. It expects to later invest in other southeast Asian countries. The intended impact aligns with the Sustainable Development Goal 7: Affordable and Clean Energy, SDG 8: Decent Work and Economic Growth, SDG 11: Sustainable Cities and Communities and SDG 13: Climate Action.

During the competition, TLG's ESG framework and reporting were evaluated as part of the Competition assessment, both by MOBILIST's own team of experts and as part of the independent operational due diligence assessment commissioned by MOBILIST. TLG's approach to reporting is detailed here, which includes a reporting framework aligned with Sustainable Finance Disclosure Regulation (SFDR). MOBILIST recognised the Company's continued commitment to IFC Reporting standards, in line with the due diligence process in the MOBILIST Competition (competition criteria stipulated that this was a minimum reporting benchmark for FCDO). MOBILIST was confident of TLG's established reporting frameworks, and noted that IFC had awarded the 2014 Sustainable Energy Finance Award to San Carlos Solar Energy Inc. (the Philippine solar investment subsidiary of the ThomasLloyd Cleantech Infrastructure Fund). In addition, SolarArise India Projects Private Limited ("SolarArise") represented a joint venture of the Anchor Investor (an Associate of the Investment Manager) with Global Energy Efficiency and Renewable Energy Fund ("GEEREF"), a fund-of-funds advised by the European Investment Bank Group.

Identifying the financing gap

MOBILIST selected TLG, and its investment vehicle TLEI, through a competitive process dedicated to sustainable infrastructure. Through this process, MOBILIST conducted a robust appraisal and due diligence assessment to support subsequent commercial negotiations. MOBILIST agreed to provide an anchor investment of up to GBP 25 million to support an Initial Public Offering for TLEI on the premium segment of the London Stock Exchange's main market. Critically, MOBILIST pursued an "underwriting" or "tapering" approach during the book building process, whereby it only invested the minimum amount deemed necessary to enable a successful IPO. Critical to MOBILIST's support for the IPO was tangible evidence of investor support during the book-building process.

An anchor investment was critical for TLEI's successful listing as it provided clear commitment to the success of the Trust, giving investors the confidence to commit their own funds. MOBILIST's final investment amount was market-driven; investing only the gap between the capital raised and the capital required for the minimal gross initial proceeds threshold for the IPO.

Identifying the market failure, risks, and barriers to investment

MOBILIST aims to address several market failures, risks and barriers to commercial investment in developing economies (outlined in Table A A.2 below) through its portfolio.

[22] www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Nov/IRENA_CPI_Global_finance_2020.pdf.
[23] www.ft.com/content/3518434e-8472-4cdb-a3db-e65289137835.

Table A A.2. Market failures, risks, and barriers to commercial investment and mitigations

Lack of data on price and risk	Developing country markets suffer from a lack of transparency on key investment appraisal metrics. Limited availability of information, the high costs of gathering information and limited publicly available information increase the risk perception of investing in developing country markets. As such, investors demand a higher risk premium. TLEI's listing provides publicly available pricing and risk information on developing country renewable assets giving investors better information to appraise and price risk. MOBILIST will develop a portfolio of assets with transparent information.
Lack of investable assets	Listed stocks and tradable bonds markets in frontier countries tend to be shallow and illiquid. The TLEI listing is one component of MOBILIST's work to surface investable assets with potential for scale in ODA-eligible countries
Fragmented markets	Private debt[24] and equity markets in developing countries are fragmented. Fragmentation makes it challenging to access investments at scale. Yet, investment products that can operate at scale with sufficient liquidity and yield are needed if mainstream institutional investors allocate capital to frontier markets. TLEI is acquiring a pool of seed assets in India and the Philippines and, with capital generated through listing, plans to expand to Vietnam, Bangladesh, Sri Lanka, and Indonesia. Investors can therefore access a pool of diverse assets at the quantum needed to meet their regulatory requirements.
Lack of liquidity	A substantial proportion of the developing country assets are private with no developed secondary markets. Further, very few listed securities offer the traded volume necessary for investors to enter or exit. MOBILIST's strategy, as exemplified by the TLEI investment, examines ways of aggregating private assets and bringing them into the regulated, publicly traded markets through various structures known to the market.
Regulatory environment and regulatory constraints for investors	Institutional investors, like UK pension funds, face regulatory constraints in their own jurisdictions. These regulations inhibit the scaling up of investment in developing countries, e.g. higher capital requirements. Investing in listed products in their own jurisdiction allows UK pension funds to access developing markets and meet their regulatory requirements. Public capital markets are undeveloped in many developing countries. MOBILIST supports developing countries in raising capital by listing on developed market stock exchanges where they can access developed market institutional investors or through dual listings, which can support the development of the local stock exchange.

Choosing the financing instrument

MOBILIST provides equity investment on market terms (the details of FCDO's investment in TLEI are presented in Table A A.3 below).

Table A A.3. Investment terms

Transaction overview	
Target Investment Trust Size	Target Gross Initial Proceeds GBP 230m. Minimum Gross Initial Proceeds GBP 89m.
MOBILIST's instrument and % Interest	Non-concessional equity investment of £24.5m % of Target Gross Initial Proceeds (10.86%) % of Minimum Gross Initial Proceeds (max 19.23%)
Private investment	£63m
Expected Return	Manager's targeted return Net IRR: 10-12% (net of all fees, expenses and taxes)
Target Investment Trust Size	Target Gross Initial Proceeds GBP 230 million. Minimum Gross Initial Proceeds GBP 89 million.

MOBILIST has a target mobilisation ratio of one to three at IPO. Against an investment of GBP 24.5 million in public capital, TLEI successfully mobilised an additional GBP 63 million of commercial capital.

[24] Private debt is comprised of mezzanine and other forms of debt financing that comes mainly from institutional investors such as funds and insurance companies and banks, which are generally illiquid, opaque and not regularly traded on organised markets. They are not publicly traded on a stock exchange and cannot easily be bought and sold on a secondary market.

Co-ordination and governance

MOBILIST is overseen by the MOBILIST Steering Committee (MSC), which comprises the implementation and control functions within FCDO and expertise and control stakeholders from other HMG Departments, including the Her Majesty's Treasury. The Steering Committee can also call upon external expert advice as required under its technical assistance facility. FCDO's Financial Transactions Steering Board (FTSB) reviews investment proposals. The board are invited to attend the MSC as full members. Investment decisions and exits are signed off by the Finance Director of the FTSB and the relevant Director-level Chair of MSC.

At the programme delivery level, the Steering Committee provides strategic advisory and oversight on the entire programme, comprising individuals drawn from the public and private sectors with investment, capital markets and finance expertise. MSC feeds into MOBILIST's "Source, Select, Support" process, known as the "S3 process", which represents a further iteration of the first competition. MOBILIST's MSC also provides advice and guidance on MOBILIST's approach to research, policy, strategy, and advocacy to build the investment ecosystem.

MOBILIST and its legal advisors conduct due diligence on participating organisations and ensure the appropriate governance structures are in place as they progress through the S3 process.

Monitoring, evaluation and exit

Monitoring and Evaluation

Each product that MOBILIST invests in will have its logframe which complements the programme's overall logframe. MOBILIST offers support to S3 participants to build investees' capacity to develop and refine appropriate M&E frameworks to enable robust data collection, analysis and reporting of development impact. Independent monitoring and evaluation support is available for each product to check progress against expected outcomes.

The TLEI logframe will include metrics on:

- Capital deployed in ODA eligible countries
- Capital mobilised from the private sector (quantity and leverage ratio)
- Job creation in ODA eligible countries
- Greenhouse gas reduction.

Exit Strategy

MOBILIST has a framework to determine its strategic exit and signal and execute disengagement in a timely, clear and commercially sensible process. All MOBILIST investments are predicated on a two – three year capital recycling strategy, but MOBILIST should always be regarded as a supportive investor. Investment and divestment decisions will be subject to review and approval by the MOBILIST Investment Committee, with sign-off at Director level.

When exiting, FCDO will aim for a public placement of its holding or a portion of its holding on the exchange where the product is listed. The buyer would likely be an institutional investor or combination of investors. The likely proceeds would be fairly-well forecasted, given the ability to reflect current market value.

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OECD Blended Finance Guidance for Clean Energy

Meeting the Paris Agreement goals will need a rapid acceleration of finance towards clean energy investments in emerging and developing economies. Blended finance is an important tool that can help mobilise commercial investment towards clean energy, whilst preserving scarce public resources for wider climate and development objectives. A systematic approach to the deployment of blended finance – that tailors instruments to the nature of underlying barriers to commercial investment, minimises concessionality, has a clear exit strategy, and is co-ordinated within a wider ecosystem of support and enabling measures – can help maximise its development impact and stimulate private sector development.

This paper explores specific features of clean energy projects, and the wider transition, to draw lessons for donors, policymakers in beneficiary governments, and financial institutions on whether and how best to deploy blended finance in the sector. It revisits the OECD DAC's Blended Finance Principles, specifically Principle 2: designing blended finance to increase the mobilisation of commercial finance, and explores their applicability to clean energy. It also explores sector-specific considerations for the deployment of clean energy, setting out the considerations development practitioners can make to inform better decision-making on, and maximise the development impact of, blended finance interventions.

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