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OECD Progress Update on Approaches to Mobilising Institutional Investment for Sustainable Infrastructure

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OECD Progress Update on Approaches to Mobilising Institutional Investment for Sustainable Infrastructure: Background paper to the G20 Sustainable Finance Study Group – Environment Working Paper No. 138

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Table of contents

Abstract **4**

Résumé **4**

Acknowledgments **5**

Executive summary **6**

1. Introduction **8**

2. A survey of institutional investment activity and demand for sustainable investment **11**

3. Catalysing the supply of sustainable institutional capital: A stock-taking of approaches **15**

3.1. Overall characteristics and investment channels used by institutional investors 15
3.2. Risk mitigants and transaction enablers 17
3.3. Public actors and institutional investor types 24

4. Summary and implications for future research **28**

Annex A. Select examples of green bonds and green securitisation **31**

Annex B. Glossary **36**

References **38**

Tables

Table 3.1. Typology of risk mitigants 18
Table 3.2. Typology of transaction enablers 20

Figures

Figure 2.1. Allocation of private pension assets in selected OECD countries, 2016 12
Figure 2.2. Recorded institutional investments with project-level interventions 14
Figure 3.1. Sector split of observed projects 16
Figure 3.2. Number and split of risk mitigants 22
Figure 3.3. Number and type of transaction enablers deployed 22
Figure 3.4. Combinations of risk mitigants (RM) and transaction enablers (TE) 23
Figure 3.5. Public actor split 24
Figure 3.6. Share of risk mitigants deployed by public actor type 25

Boxes

Box 3.1. Scaling-up institutional investment through innovative syndication 26
Box 3.2. Scaling-up institutional investment through innovative credit enhancement 27

Box A.1. Attributes recorded in the database 30

Abstract

The large need for investments in sustainable infrastructure will require investments from the private sector, including institutional investors. This working paper contributes to scaling up investments by analysing public project-level interventions for projects involving institutional investors. It presents findings from an updated database on institutional investments in environmentally sustainable infrastructure with project-level intervention by the public sector. The database contains 152 observations from projects in G20 countries between 2010 and 2018. The database includes, among others, details on channels of finance as well as tools and techniques used by public actors to mitigate financial risks of investors and enable transactions. The data show that renewable electricity, and specifically the wind sector, dominate sustainable institutional investments with public intervention. More than two-thirds of projects in the database are financed through an intermediary who finances unlisted project equity. Findings further show that almost all projects benefit from a risk-mitigating public intervention and in almost half of the cases more than one. Transaction enablers are used in a quarter of cases and rarely without risk mitigants present.

Résumé

Le grand besoin d'investissements dans des infrastructures durables nécessitera des investissements du secteur privé, y compris des investisseurs institutionnels. Ce document de travail contribue à l'augmentation des investissements en analysant les interventions publiques pour les projets impliquant des investisseurs institutionnels. Il présente les résultats d'une base de données mise à jour sur les investissements institutionnels dans les infrastructures durables dans le domaine environnemental avec l'intervention du secteur public au niveau des projets. La base de données contient 152 observations de projets réalisés dans les pays du G20 entre 2010 et 2018. La base de données comprend, entre autres, des détails sur les canaux de financement ainsi que les outils et techniques utilisés par les acteurs publics pour atténuer les risques financiers des investisseurs et faciliter les transactions. Les données montrent que la production d'électricité renouvelable, et plus particulièrement dans le secteur éolien, domine les investissements institutionnels durables avec intervention publique. Plus des deux tiers des projets de la base de données sont financés par un intermédiaire qui finance des fonds propres non cotés. Les résultats montrent que presque tous les projets bénéficient d'une intervention publique visant à atténuer les risques et, dans près de la moitié des cas, plus d'une intervention publique. Les facilitateurs de transaction sont utilisés dans un quart des cas et rarement sans la présence d'agents d'atténuation des risques.

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Executive summary

This working paper updates research undertaken in OECD's 2016 "Progress Report on Approaches to Mobilising Institutional Investment for Green Infrastructure", which the OECD contributed to the 2016 G20 Green Finance Study Group. This paper presents key findings from an existing OECD database of environmentally sustainable infrastructure projects in G20 countries involving institutional investors, which was updated as part of this project, to add more than 100 projects. These environmentally sustainable infrastructure projects (subsequently referred to as "sustainable infrastructure") include renewable electricity plants, energy efficiency projects, and waste treatment plants. The projects considered for the database are those financed, refinanced or acquired by institutional investors and which involve project-level intervention by the public sector (e.g. ministries and state agencies).

The large need for investments in sustainable infrastructure will require investments from the private sector, including institutional investors. According to the 2017 OECD report *Investing in Climate, Investing in Growth*, investment needs for infrastructure are estimated to be around USD 6.3 trillion annually between 2016 and 2030. Taking into account the additional needs to reach a well-below 2°C temperature goal, the estimate increases by 10% to USD 6.9 trillion. Even though public finance can and does play a critical role to facilitate, leverage and guide investment, investment on this scale will require large-scale private sector engagement. However, financing for infrastructure, including sustainable infrastructure, through traditional public or private sources is impeded by substantial financial, regulatory and structural constraints.

Harnessing the financial weight of institutional investors to finance sustainable infrastructure needs could in principle cover a large part of sustainable infrastructure financing needs. Institutional investors in OECD countries alone manage up to USD 84 trillion of assets under management (including OECD asset owners such as pension funds, insurance companies and global public reserve funds, as well as asset managers such as investment funds). Even considering that large parts of the USD 84 trillion will remain unavailable since institutional investors typically need to diversify investment, very little of institutional investors' assets is allocated to direct investments in sustainable infrastructure projects yet. There are expanding pockets of institutional investment activity showing the potential for institutional investor activity in sustainable finance, even if they are currently relatively small. Results of an OECD survey of large pension funds suggest that only 1% of assets are directly allocated to infrastructure equity in 2017, and sustainable infrastructure accounted for only a fraction of that. However, institutional investor interest in sustainable infrastructure investments is growing.

Sustainable infrastructure projects, like most infrastructure projects, have a number of unique cash flow characteristics which can appeal to investors who have long-dated liabilities. For example, renewable electricity assets can provide steady, long-term, inflation-linked income streams with low correlation to the returns of other investments. In an environment of low-to-modest interest rates and generally low yields for fixed income, these projects could in principle be attractive to institutional investors – provided that governments provide an adequate enabling investment environment. These investors could therefore play a much greater role especially as "recyclers of capital". They could relieve

the balance sheets of other short-term investors by re-financing loans and freeing up capital for further financing of new projects or acquisition of operational projects.

The research presented in this paper is based on a database of 152 projects in G20 countries, spanning the years 2010-2018. The database records the channels used by institutional investors (e.g. makes distinctions between direct, i.e. "in-house", and indirect investment, i.e. by creating a contract with an intermediary). It also records the tools and techniques employed by public actors such as green investment banks or development banks to mobilise and catalyse institutional investors' participation. The database spans 7 sustainable infrastructure sectors, with multiple sub-sectors. As foundation for the database, this paper provides working definitions for the categories of financial instruments risk mitigants and transaction enablers.

Overall, the projects for which data is available largely are from the advanced G20 countries, most notably in the United Kingdom (UK), and are predominantly renewable electricity projects. More than half of the recorded projects are placed in the UK, followed by Brazil, Australia, China and the United States. Recorded projects from the renewable electricity sector are dominated by the wind sector, followed by solar electricity as well as other energy categories including energy efficiency. Despite this dominance of energy-related projects, the database also contains other sustainable projects such as nature conservation and sustainable agriculture projects. Note that while the employed data research approach ensures the greatest possible comprehensiveness given the available data sources, the database cannot claim to be comprehensive or free from bias towards readily available data, and is therefore not necessarily representative.

The database shows that institutional investors in these projects use intermediated unlisted project equity more often than other possible investment pathways, e.g. direct investment in listed project equity. This means that institutional investors in the sample prefer to invest in a project through an infrastructure fund or other externally managed vehicles, and by investing equity rather than issuing debt.

As the stocktaking of employed financial tools and techniques of the database shows, public actors already use a variety of approaches to mobilise and catalyse institutional investment in sustainable infrastructure. The database shows 246 uses of the 10 recorded instruments for *risk mitigation*, i.e. interventions for which a public actor assumes contingent liability. The three most prevalent risk mitigants are loans, co-investments and cornerstone stakes (i.e. co-investments with a majority stake taken by a public actor). The database also shows 24 uses of the four observed *transaction enablers*, i.e. interventions which catalyse investment activity such as warehousing and pooling.

The recorded data show a frequent use of cornerstone stakes by public actors and the frequent collaboration of two public actors. Cornerstone stakes are especially frequently used by the green investment banks in the dataset. Both cornerstone stakes and additional public involvement could be seen as clear signs of reduced risk and therefore mobilise further institutional investment.

1. Introduction

Investment from the private sector, including from institutional investors[1], is crucial to meeting the large need for investments in infrastructure. Globally, infrastructure e.g. for electricity, water and transport, needs investment of USD 6.3 trillion annually between 2016 and 2030 (OECD, 2017[1]). Making these investments compatible with a low-carbon pathway consistent with the well-below 2°C goal would increase costs to USD 6.9 trillion. Even though the additional cost is only 10%, the overall scale of investments in either case is so large that infrastructure financing will inevitably have to rely in large part on mobilising private capital.

Institutional investors manage USD 84 trillion[2] in assets in OECD countries alone (OECD, 2017[2]) **,** but very little thereof is currently allocated to environmentally sustainable infrastructure[3] like renewable electricity plants, energy efficiency projects or waste treatment plants[4]. Even considering that large parts of the USD 84 trillion will remain unavailable since institutional investors typically need to diversify investment, previous reports have focused on the potential for these investors to finance a part of sustainable infrastructure needs (Della Croce and Yermo, 2013[3]; Kaminker et al., 2013[4]; Inderst, 2016[5]; Nelson and Pierpont, 2013[6]; OECD, 2017[7]). While pockets of investment by institutional investors in sustainable infrastructure are expanding, institutional investments in sustainable infrastructure are still comparatively small. Available data suggests that infrastructure assets comprise a minute fraction of institutional investors' portfolios: The OECD 2018 Survey of Large Pension Funds and Public Pension Reserve Funds of funds managing more than USD 10 trillion in assets finds that they have only about 1% of their assets directly invested in infrastructure (OECD, 2018[8]). And only a fraction of this is invested in sustainable infrastructure. Similarly, the International Renewable Energy Agency and the Climate Policy Initiative report institutional investments in renewable electricity at less than 1% of all direct investments (International Renewable Energy Agency and Climate Policy Initiative, 2018[9]). However, three caveats should be noted to put figures on institutional investment in sustainable infrastructure in context.

- First, some components of the USD 84 trillion (e.g. defined benefit pension funds) align better with long-dated investments in sustainable infrastructure investments than other components (e.g. defined contribution pension funds). Therefore, while USD 84 trillion is under management, not all of these assets are likely to be available for sustainable infrastructure.

[1] The term *institutional investors* includes asset managers as well as asset owners like pension funds and insurance companies. For the exact definition of institutional investors used for the database underlying this paper, see section 3.2.

[2] Including OECD asset owners (pension funds, insurance companies, sovereign wealth funds) as well as asset managers and investment funds.

[3] The terms *environmentally sustainable infrastructure* and *sustainable infrastructure* are used interchangeably in this paper. In this paper they both describe projects of the sectors in the list shown in section 2.

[4] See section 2 for a full list of considered infrastructure sectors.

- Second, institutional investors mainly invest in equities and bonds. These investments can in some cases indirectly provide financing for sustainable infrastructure projects; equity investments may be made in companies developing renewable electricity projects, and investments in green bonds may provide direct financing at project level, or may be used to refinance existing renewable electricity projects, freeing up bank balance sheets to finance more projects. However, measuring the impact of indirect financing channels is challenging.
- Third, there are expanding pockets of institutional investment activity. This shows the potential for institutional investor activity in sustainable finance, even if current levels of sustainable infrastructure equity investments by institutional investors are relatively low.

Sustainable infrastructure projects, like most infrastructure projects, have a number of cash flow characteristics which can appeal to investors with long-dated liabilities. For example, renewable electricity assets can provide steady, long-term, inflation-linked income with low correlations to the returns of other investments. Therefore many sustainable infrastructure projects could in principle be attractive to institutional investors, and could play a much larger role in institutional portfolios than they do currently. By re-financing loans for sustainable infrastructure projects or by acquisition of operational projects, institutional investors could free up the capital of other financial actors. These other actors, e.g. banks, are better equipped to take on the risks of financing of new projects rather than to keep holding operational assets.

Unless a project has a sufficient risk-return profile or unless an institutional investor has integrated sustainability in the investment decision-making process, institutional investors will not necessarily invest simply because a project has sustainability credentials. The asset allocation process for institutional investors is complex and varies substantially from investor to investor (OECD, 2015[10]). For example it can vary due to risk appetite, regulations, liability profiles, or other investment preferences and constraints. In addition, information asymmetry, lack of sufficient data to analyse performance of sustainable assets, and absence of definitions and standards are some of the key barriers that further prevent institutional investment in this space (Ang and Copeland, 2018[11]). Institutional investors will first and foremost invest in projects based on risk-adjusted financial performance, and not necessarily based on how "sustainable" an investment is. Even if projects with and without sustainability credentials have an otherwise equal revenue profile, an investor might prefer the non-sustainable project if the information on such projects and therefore the risk-return evaluation is better. Hence, sustainable projects have barriers to overcome often even before sustainability is considered at all. One of these barriers is the lack of data. In other words, since many investors believe that investing in sustainable assets involves sacrificing returns (OECD, 2017[12]), the lack of financial performance data for sustainable assets and the related risk perception is a particularly important challenge to address.

For institutional investors to invest in sustainable infrastructure projects, even if there is potential for good financial performance, fundamental conditions for investment have to be established: Environmentally-related policies as well as an adequate investment environment have to be in place; policies need to be predictable and send clear market signals (Ang, Röttgers and Burli, 2017[13]; OECD, 2015[10]). When pre-conditions are met and support policies are in place, pockets of institutional investment in sustainable infrastructure can grow. For example, while the equity mix of European wind energy projects included only 6% institutional investments in 2010, the share increased to 37% in

2015 (OECD, 2016[14]). However, due to currently insufficient support and pre-conditions, and in spite of advances in carbon-disclosure and awareness of the climate-risk in a portfolio (Ang and Copeland, 2018[11]), institutional investors overall still invest very little in sustainable projects "organically", i.e. without policy incentives and support (Kaminker, 2016[15]).

This *Progress Update* identifies examples of institutional investments with public interventions[5] which aim to support sustainable infrastructure investments in G20 countries, extending the database of Kaminker (2016[15]). This Update is an extension and continuation of data collection and analysis in the 2016 OECD Progress Report on Approaches to Mobilising Institutional Investment in Green Infrastructure. Like the *Progress Report*, this *Progress Update* builds on the framework on investment channels and discussion of tools and techniques provided by the OECD report "Mapping Channels to Mobilise Institutional Investment for Sustainable Energy", and relates to other G20/OECD reports on institutional investors as well as long-term financing and sustainable infrastructure. This update extends the database from 33 to 152 projects and provides methodological underpinning to prepare future updates.

Following this introductory section, the next section (2) provides a review of institutional investment in sustainable infrastructure to put the findings from the database in context. Section 3 provides an overview of the projects in the database and findings based on these observations, and section 4 concludes with key takeaway messages from the database update and implications for future research. For details on the methodology, please refer to Annex A, and for technical terms used throughout the paper please refer to the Glossary in Annex C.

[5] For the purpose of this paper, public intervention refers to *project-level* intervention by a public financial actor with the aim to de-risk the project(s) or otherwise enable institutional investment by either financing a project, directly or through intermediation, or backing a project with financial instruments using public finance (also see Annex A for definitions).

2. A survey of institutional investment activity and demand for sustainable investment

This section provides a brief introduction to institutional investment and describes details of data collection. This context serves as basis for the description and interpretation of the database findings in section 3.

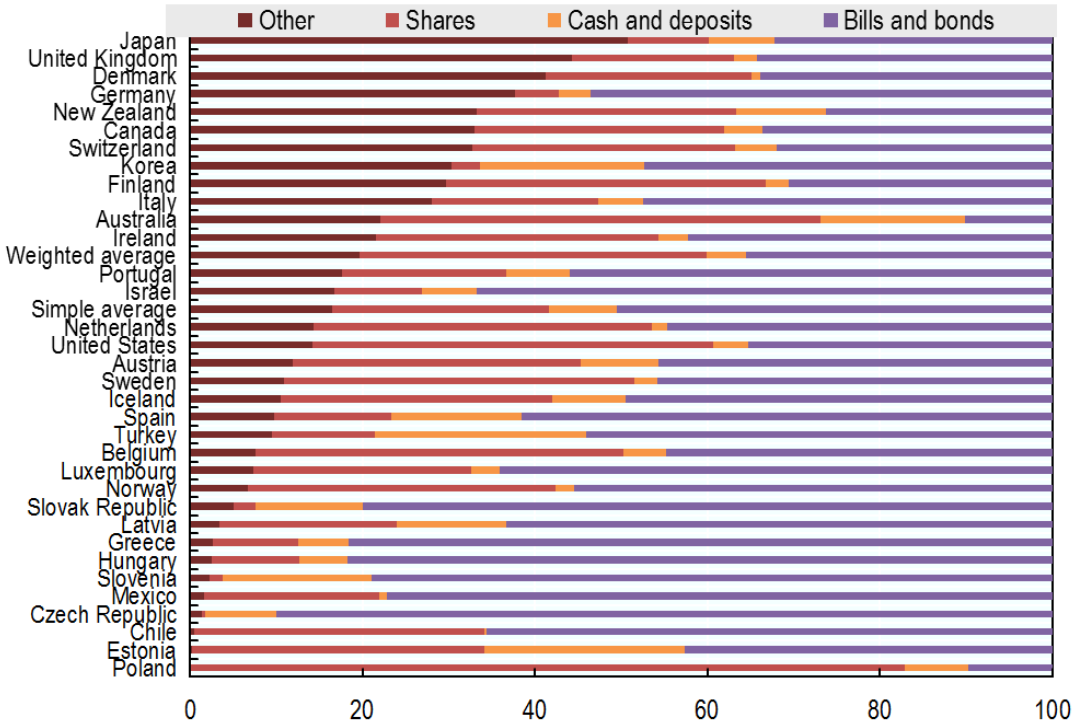
While no unified and systematic database exists for tracking stocks and flows of institutional investments in sustainable infrastructure, existing data sources show a picture of a small but growing market. Apart from two estimates -- that large pension funds and pension reserve funds invest 1% in infrastructure (OECD, 2018[8]), and that institutional investment in renewable electricity accounts for less than 1% of all investment in renewable electricity --few other data exist to complete the picture. For a set of listed institutional investors, the Asset Owners Disclosure Project reports USD 203 billion, i.e. 0.5% of indexed assets under management (AUM), are invested in low-carbon assets in 2017 (Asset Owners Disclosure Project, 2018[16]). This is a 68% increase relative to 2016 (USD 138bn), and the 2016 figure itself represented a 63% increase on 2015. In segments of the market the increase seems to be even steeper. By the measures available, while institutional investment in sustainable infrastructure is overall a small part of investments, it continues to grow.

Pension funds, as an example of institutional investors, can have different appetites for asset allocation despite similar mandates (see Figure 2.1). For many pension funds, allocation to *other* investments, including investments in the real economy such as infrastructure, is not substantial.

Given the scale of additionally needed sustainable infrastructure investments, investments by institutional investors could play a key role as major suppliers of needed capital**.** The low-carbon transition is unlikely to be solely financed on corporate balance sheets and by debt financing (e.g. bank loans, bonds) alone. Among others, unintended consequences of Basel III financial regulations make it harder for banks to finance long-term infrastructure projects than before (FSB, IMF and WB, 2012[17]; OECD, 2013[18]). Ang, Röttgers and Burli (2017[13]) show that Basel III may have unintentionally constrained the ability of banks to provide long-tenor debt financing to capital-intensive renewable power infrastructure projects.

Figure 2.1. Allocation of private pension assets in selected OECD countries, 2016

As percentage of total investment



Note: The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: OECD Global Pension Statistics.

Sustainable infrastructure projects often have investment properties that in principle would allow institutional investors to take on a larger role as direct investors in such projects. Many sustainable infrastructure projects typically provide stable yields and long-term maturity while in operation. These properties are often sought by institutional investors, as these projects match their investment appetites for stable returns with low correlations to other asset classes (OECD, 2015).

Various approaches are being used to encourage institutional investment to tap into the financial potential of sustainable infrastructure projects. For example, a refinancing of a portfolio of 7 projects loans by National Australian Bank was facilitated by an anchor investment from the Clean Energy Finance Corporation (CEFC). Securitisation of consumer receivables from residential energy efficiency projects is another refinancing route observed in Australia and facilitated by the CEFC. Box 3.2 highlights another credit enhancement instrument deployed by the Asian Development Bank and the India Infrastructure Finance Company Ltd. to refinance project loans and recycle capital for new asset financing.

The database described in detail below is an effort to give an overview of institutional investment in sustainable infrastructure, with a focus on project-level intervention by public actors. Currently available public and proprietary data sources show gaps with respect to projects involving institutional investors. Data is especially scarce for institutional

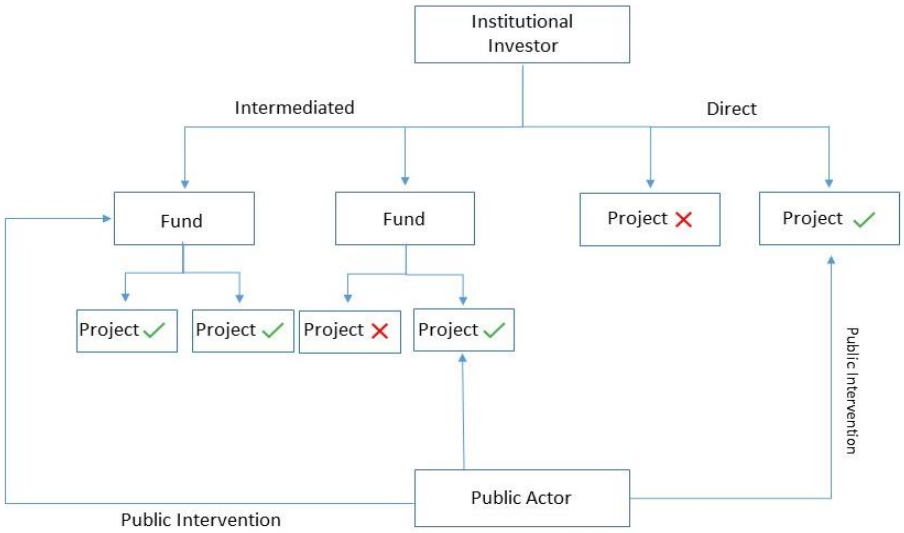
investments where these are not made directly but rather through investments funds or other vehicles. The data research described in the following aims to provide pieces of the puzzle by gathering available data with a focus on project-level public intervention. The data collection has a particular focus on the financing tools and techniques used, and it records those in detail.

To ensure comparability of observations and a useful level of detail on institutional investments associated with a public investment component, this analysis adheres to the methodology outlined in Annex A. This methodology provides working definitions for *institutional investment* and *public intervention* to provide comparability between observations and allow distinctions. The methodology also outlines the search strategy aiming for the greatest possible comprehensiveness with a given high level of detail. The following paragraphs provide a summary of this methodology.

For a project to be considered for the database, it must be financed, either in full or part, by institutional capital. For the purpose of the database the following four kinds of investors are considered institutional investors: *insurance companies*, *pension funds*, *pension reserve funds* and *sovereign wealth funds*. Institutional investors may be involved directly or through an asset manager or an investment vehicle such as an infrastructure fund or renewable energy fund (compare Figure 2.2). Note that the infeasibility of tracking all investors in a bond structure forces the database to only include bonds for single projects for which information on actors is available and clear.

Further, for a project to be considered in the database, it has to have an element of public intervention at the project level. That means a public financial actor, e.g. a ministry or any public financial institution like a green investment bank, makes a *project-level* intervention with the aim to de-risk the project(s) or otherwise enable institutional investment (see Annex A for definition of *public actor* and section 3.3 for a list of recorded public actor types). This might be done by either financing a project, directly or through intermediation, or by backing a project with financial instruments using public finance. This distinguishes recorded projects from those with public intervention at the policy-level, i.e. through feed-in tariffs or tender programs. Based on Kaminker (2016[15]), project-level interventions are differentiated into *risk mitigants* and *transaction enablers* (see Figure 2.2 for an overview of relations and Annex A as well as section 3 for definitions).

Figure 2.2. Recorded institutional investments with project-level interventions



Note: This figure is a schematic representation of the necessary and sufficient conditions under which the database includes a project. The 'tick' indicates the type of projects included while the 'cross' indicates the type of projects excluded.

Source: Authors.

The database relies on a shortlist of relevant sectors as definition of what is covered under *sustainable infrastructure*. The current version includes sectors from the following list of sustainable infrastructure sectors, which might be updated for future versions:

- Renewable electricity,
- Energy efficiency,
- Pollution prevention,
- Agriculture,
- Biodiversity,
- Transport, and
- Waste treatment.

While the database has been greatly expanded from the 2016 database by more than 100 projects, it is not comprehensive. Furthermore, the data in the database by itself cannot show causality. While the aim of project-level interventions is to mobilise institutional investment, the data cannot show this causal relationship (see also OECD (2017[19]) and McNicoll, Jachnik and Montmasson-Clair (2017[20])). Analysing this causal relationship would be useful future research, but is beyond the scope of this paper.

3. Catalysing the supply of sustainable institutional capital: A stock-taking of approaches

This section presents results of 152 observations of sustainable infrastructure investments by institutional investors with involvement of public actors. It analyses the sector and country[6] distribution, the actor composition on the public side and on the side of institutional investors, the prevalent channels for investment as well as the risk mitigants and transaction enablers deployed by public actors.

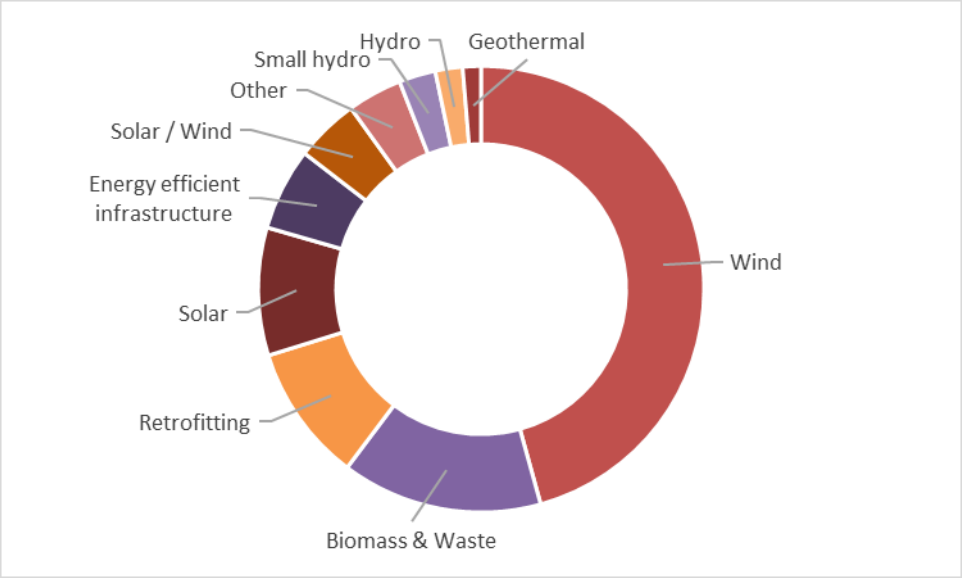
An overview of the 152 observations of the database suggests that public actors continue to deploy a range of de-risking or facilitating tools and techniques to mobilise institutional investment in sustainable infrastructure in G20 countries. The updated sample in the database now provides a broader and deeper picture. Besides adding more than 100 observations, the database now contains newly added financial instruments, project sectors and activity of previously unrecorded public actor types. Tables 1 and 2 classify the different tools and techniques for de-risking and facilitating, and also provides additional information as well as examples for these project-level interventions.

3.1. Overall characteristics and investment channels used by institutional investors

As Figure 3.1 shows, the sample is dominated by renewable electricity projects, followed by energy efficiency projects, likely due to attractive properties of these projects for institutional investors. Within renewables, wind projects eclipse other renewable project types in terms of total observations. The dominance of renewables, and wind within renewables, is unsurprising given the relevant factors: risks in renewable electricity are by now well documented, solar and wind projects can often be scaled to larger investments, and these sectors receive a large amount of attention from policymakers.

[6] The database considers all member countries of the European Union (EU) as G20 countries. This means the data search covers 24 EU countries represented by the G20 membership of the EU as a single body in addition to the 19 other separate members of the G20. While not all countries are represented in the database since projects with this narrow definition could not be found in all countries, the database covers 15 out of the 43 relevant countries.

Figure 3.1. Sector split of observed projects



Notes: The database categorises all hydro projects below 25MW as *Small hydro*; all other hydro is captured in the category *Hydro*. The sector label *Solar/Wind* refers to a set of seven projects included in the NAB Low Carbon Shared Portfolio (Australia). Given that project particulars have not been publicly disclosed, this paper is unable to precisely distinguish the solar and wind projects in the portfolio. The sector label *Other* covers projects in the categories *Pollution prevention, Biodiversity, Transport, Waste treatment, agriculture*.

Source: Authors.

Observations in the sample are not equally distributed throughout G20 countries; most observations occur in advanced OECD countries, and particularly in the United Kingdom[7]. Among the G20 countries[8], more than half of institutional investments with public intervention took place in the United Kingdom (UK), followed by Brazil, Australia and China. The predominance of the UK can be explained by the intensely engaged UK Green Investment Bank[9]. Similarly, activity in the second and third ranked countries are also explained by the engagement of dedicated domestic organisations: the domestic development bank BNDES in Brazil and the green investment bank CEFC in Australia.

As described in "Mapping Channels to Mobilise Institutional Investment in Sustainable Energy" (OECD, 2015[10]), a variety of investment channels are potentially available to

[7] Note that while the employed data research approach (see Annex A) ensures the greatest possible comprehensiveness given the available data sources, the database cannot claim to be comprehensive or free from bias towards readily available data, and is therefore not necessarily representative.

[8] For the sake of this study and the presented database, the G20 is considered to include all member countries of the European Union (EU). This means the data search covers 19 single countries represented in the G20 as well as additional 24 EU countries represented by the G20 membership of the EU as a single body.

[9] The UK Green Investment Bank (GIB) was established by the Government of United Kingdom in 2012 as a non-departmental body of the Department of Business, Energy and Industrial Strategy (UK BEIS). It was acquired by Macquarie Group Limited in August 2017 and is now an independent private organisation. This database only covers projects, de-risked or facilitated by the UK GIB, before its privatisation.

institutional investors for accessing sustainable infrastructure, and considering different factors in choosing these channels. For example, large institutional investors evaluate prospective investments based on decisions to make the investment directly ("in-house") or to create a contract with an intermediary ("out-source") to make the investment on their behalf. Channels can provide exposure to listed or unlisted debt or equity, a single project asset or company or can bundle multiple smaller-scale projects together. While the database contains listed as well as unlisted projects as well as debt and equity investments, it focusses only on project-level investments by definition.

In the sample, only five (out of the many available) channels for institutional investments are observed, with one clearly preferred channel (see Annex A as well as OECD (2015[10]) p. 75 for an overview figure of possible channels with examples). Most projects in the database are financed through equity, which is expected given that institutional investors are generally more prone to invest equity than issue debt. Intermediated unlisted project equity is the most common channel of finance: more than two-thirds of projects are financed through this channel. Again, it is expected that investments by institutional investors do not invest predominantly directly, but rather through intermediaries, as knowledge regarding project investment opportunities is not their core expertise. Intermediated unlisted project debt and direct unlisted project equity are the second-most used channels, at 11% and 15% respectively. Intermediated listed project equity and direct unlisted project debt channels are in the single digit percentages. As many channels use bond structures which do not report the projects, it is infeasible to attribute institutional investors to concrete projects for the sake of the database. Since they nevertheless might provide relevant examples in this context, the paper contains relevant examples in Annex B.

Most investments have been made in new assets, but acquisition of projects and refinancing play a role as well. While 61% of projects are new assets, 20% of the investments recorded are acquisitions of existing projects and 9% refinance projects (a further 10% of projects did not have information on their transaction type).

3.2. Risk mitigants and transaction enablers

The sample in the database contains 10 types of risk mitigants, and 4 types of transaction enablers. Table 3.1 catalogues the different types of risk mitigants, with a description and illustration of each; Table 3.2 does the same for transaction enablers.

Table 3.1. Typology of risk mitigants

Risk Mitigants	*Risk mitigants are defined as either a direct use of public finance or backing a project with public funds which puts public funds at risk. In short, the public actor has a contingent liability.*				
Name	**Description**	**Frequency in database**	**Example**		
			Project	**Public actor(s) involved**	**Institutional investor**
Co-investment	Public actor(s) invest alongside private investor(s) with either debt or equity with an equal or lower stake than a private investor (any larger investment would be classified as cornerstone stake)	79	Kathu Concentrated Solar Power Project	Development Bank of Southern Africa (DBSA)	Government Employees Pension Fund (GPIC)
Cornerstone stake	Investment by a public actor in a fund, issue or project amounting to a majority equity stake so as to achieve a demonstration effect to attract other investors	68	NAB Low Carbon Shared Portfolio Project 1	Clean Energy Finance Corporation (CEFC) Australia	Insurance Australia Group Ltd., undisclosed institutional investors
Loan	Debt issuance by a public actor	60	Veja Matte Offshore Wind Farm	KfW, Bayerische Landesbank, Landesbank Hessen-Thueringen Girozentrale	PensionDanmark A/S and other undisclosed institutional investors through Copenhagen Infrastructure II
Loan guarantee	Guarantee by a public actor to pay any amount (either in full or part) due on a loan in the event of non-payment by the borrower	20	Walney Island Offshore Wind Farm Extension Phase II	EKF	PensionDanmark A/S, Pensionskassernes Administration A/S, Legal & General Group PLC Pension Insurance Corp, undisclosed institutional investors through asset management companies
Public seed capital or grants	Concessional fund allocation using public money	6	SolarReserve Crescent Dunes STEG Plant	United States Department of Energy	Canada's Public Sector Pension Investment Board, Ontario Teachers' Pension Plan

Risk Mitigants	*Risk mitigants are defined as either a direct use of public finance or backing a project with public funds which puts public funds at risk. In short, the public actor has a contingent liability.*				
Name	**Description**	**Frequency in database**	**Example**		
			Project	**Public actor(s) involved**	**Institutional investor**
Revenue guarantee	Guarantee by a public actor to pay for the core product to ensure revenue cash flow for a project.	3	Seine Rive Gauche	French Treasury	KGAL Investment Management
Back-stop guarantee	Guarantee by a public actor to purchase any unsubscribed portion of an issue (debt or equity)	3	Hindustan Solar	Asian Development Bank (ADB)	Undisclosed
Liquidity facility	A facility by a public actor allowing the borrower to draw thereupon in case of a cash flow shortfall	3	Thames Tideway Tunnel	Government of United Kingdom	Allianz, Swiss Life Asset Managers, Undisclosed institutional investors through Amber Infrastructure Group, Dalmore Capital Limited
Political risk insurance	Guarantee by a public actor to indemnify in case of political risks like currency inconvertibility, expropriation etc.	1	Elzaig Hospital Campus Project	Multilateral Investment Guarantee Agency (MIGA)	Undisclosed

Source: Authors, based on Kaminker (2016[15]).

Table 3.2. Typology of transaction enablers

Transaction Enablers	*Transaction enablers are defined as interventions, by a public entity that do not finance a project directly or put public funds at risk, but facilitate investment from other actors private or public. Transaction enablers are purely catalytic and no contingent liability is assumed by public funds.*				
Name	**Description**	**Frequency in database**	**Example**		
			Project	**Public actor(s) involved**	**Institutional investor**
Warehousing and pooling	Bundling together smaller projects or demand to achieve commercial scale that is attractive and viable for institutional investors.	15	Tappaghan Mountain Wind Farm	UK Green Investment Bank	Undisclosed institutional investors through the Greencoat UK Wind PLC
Offtake agreements	Agreements/arrangements with a public actor that has the effect of mitigating project off-take risk (not necessarily for taking off the core product; could also be a renewables quote/certificate).	5	Kiata Wind Farm	Government of Victoria	Undisclosed institutional investors through asset management company
Blending	The strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries[10]. Note that blending can happen without public funds. If indeed a public is involved, this database also records it as co-investment.	3	PT Royal lestari Utama	UN Environment	Undisclosed investors through ADM Capital
Syndication platform	Any mechanism put in place by a public actor to syndicate investments by institutional investors	1	SolarVision Celina PV Plant	Government of the United States	Undisclosed institutional investors through New energy Capital, Clean Tech Infrastructure Fund

Source: Authors, based on Kaminker (2016[15]).

[10] Note that this notion of causality was not possible to check for project so for practical use the use of blended finance was only recorded as such if and only if the project description called financing blended finance or blending. All remaining projects where blended finance might have been the instrument of used but not made explicit are recorded as co-investment (if a public actor indeed was provider of finance and not just of a blending platform).

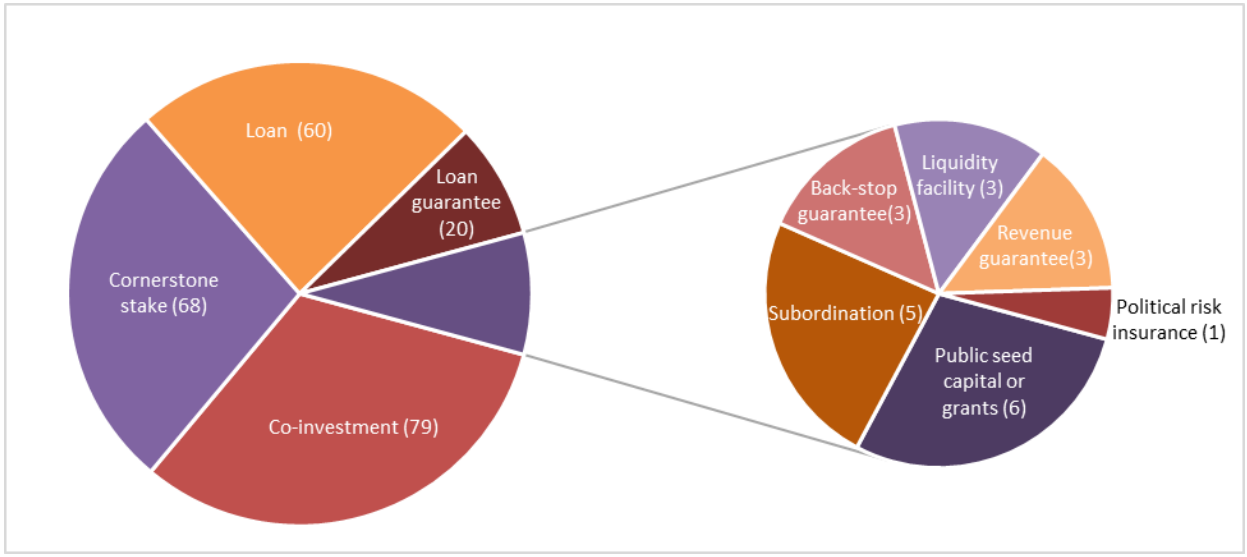
Across the 152 projects, the database reports 246 uses of risk mitigants for 149 projects. Risk mitigants increase the attractiveness of sustainable infrastructure projects, by reducing a range of risks like credit risk, counterparty risk, offtake risk, financial risk etc. This increases the acceptability of such assets for private investors, including institutional investors that are particularly risk-averse (e.g. pension funds). Almost all observed projects benefitted from at least one risk mitigant and more than half of the projects involved more than one risk mitigant. Note here that possible multiple use could be a coinciding use of tools and techniques, but could also be a nested use. For example, a blended finance approach could include a loan or guarantee as part of the same financing process. In these cases the blended finance approach is recorded as transaction enabler and the loan or guarantee as risk mitigant.

This database update adds new risk mitigant and transaction enabler types to those included in the 2016 report, and also merges and re-categorises two transaction enablers. The newly observed risk mitigants are back-stop guarantees, liquidity facilities and political risk insurances, and the newly added transaction enabler is the offtake agreement. The aforementioned risk mitigants are not new financial instruments in the broader infrastructure finance landscape. However, their application to support sustainable infrastructure adds to the tools available to public actors to catalyse institutional investment. As opposed to Kaminker (2016[15]), the *joint-ventures/partnerships* transaction enabler category has been merged with *co-investments* and re-categorised as a risk mitigant, because in the observed cases public finances assume contingent liability.

The three most prevalent risk mitigants are *co-investments, cornerstone stakes, loans and loan guarantees* (see Figure 3.2). They were used in 79, 68, 60 and 20 of the observed cases, respectively. Their dominance as de-risking tools is unsurprising as they are commonly used financing mechanisms for project finance.

Other more rarely used tools and techniques are used frequently as well (see Figure 3.2). Back-stop guarantees, for instance, could be helpful and therefore attractive as a last resort subscription security for any unsubscribed portion of a projects' bond or equity issuance thus ensuring that the project is financed. A revenue guarantee hedges offtake risk (i.e. the risk that the power produced by the plant will not be fully sold, thus negatively affecting the revenue stream of the project). As such it mimics other effective support policies, such as feed-in tariffs. Such a one-off, project-specific application (as opposed to an on-going policy like a feed-in tariff policy) makes it easier for the public actor to control costs while at the same time provide effective support. Lastly, the database includes an example of a liquidity facility, which is an instrument to reduce credit risk that otherwise would keep investors from entering a project.

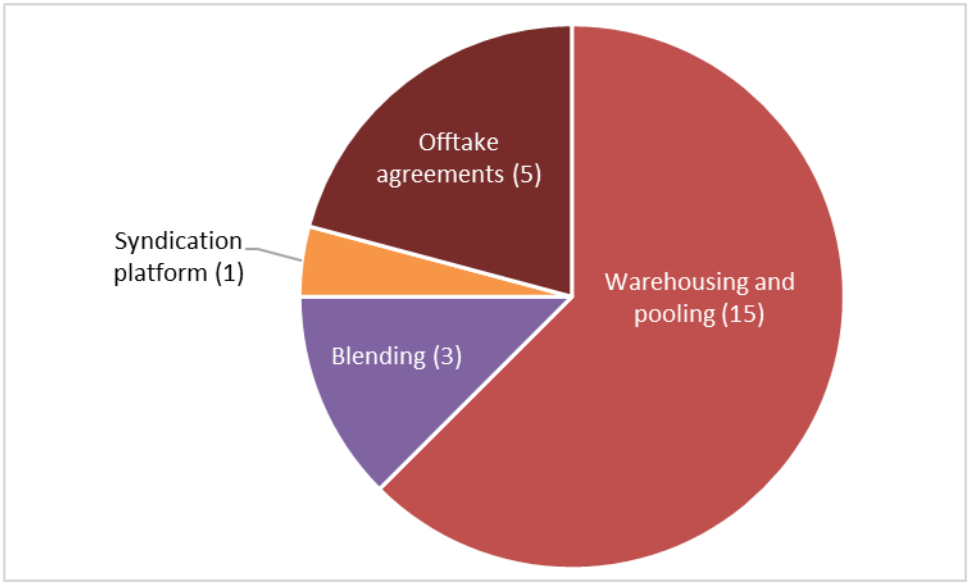
Figure 3.2. Number and split of risk mitigants



Source: Authors.

Across the 152 projects, the database reports 24 uses of transaction enablers for 25 projects; so about a sixth of the observations make use of a transaction enabler. Figure 3.3 shows the relative and absolute use of the four types of observed transaction enablers. It shows that the most prevalent such technique was securitisation, summarised as *warehousing and pooling*, and accounting for more than half of all uses of transaction enablers. Offtake agreements account for the second largest number of projects using transaction enablers, followed by blending and syndication platform.

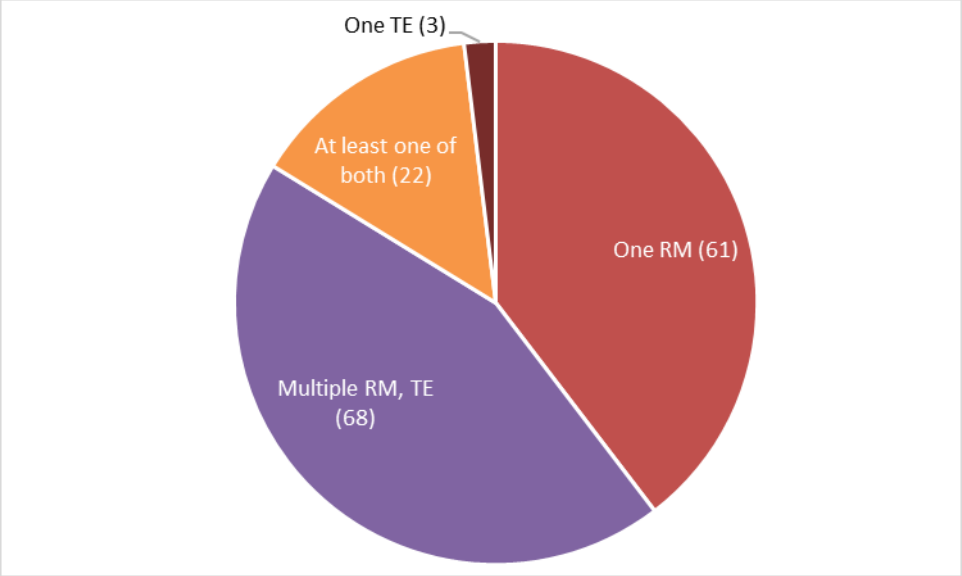
Figure 3.3. Number and type of transaction enablers deployed



Source: Authors.

The combined use of instruments for more than half of the projects shows that there is no exclusivity of instruments, and that there is an opportunity for synergetic use of risk-mitigants and transaction enablers (Figure 3.4)**.** More than 43% of projects show the combined use of risk mitigants, and an additional 14% show a combined use of at least one risk mitigant and one transaction enabler. The database contains examples of one public actor applying more than one tool or technique as well as examples of collaboration among different public actors. For example, in the case of the Neoen Cestas PV Park, the EIB took both a cornerstone stake in the Eurofideme III fund which provided both, a portion of the equity capital together with other investors as well as a project loan. As an example of collaboration, the database records the case of the Elazig hospital project in Turkey which was credit enhanced jointly by the MIGA and EBRD.

Figure 3.4. Combinations of risk mitigants (RM) and transaction enablers (TE)



Note: The database contains no data for the missing category of multiple transaction enabler use without use of risk mitigants.

Source: Authors.

Loans (as opposed to other debt instruments) are the risk mitigation instrument most frequently combined with other risk mitigants, such as co-investments, cornerstone stakes loan guarantees. That loans are often used in combination with other risk mitigation tools is not surprising since they are a common means for financing infrastructure. However, they are more often combined with other tools than other common risk-mitigants like co-investments and cornerstone stakes.

Certain other instruments seem to be used exclusively in combinations. Backstop guarantees are rarely employed, and (in the sample) are never employed without other instruments accompanying them. One reason for this combination could be that the backstop guarantee in itself is an incentive for public actors to ensure the success of the project through other instruments and avoid a situation in which the guarantee takes effect. Warehousing is combined with co-investments and cornerstone stakes in the single example of warehousing in the database (Greencoat UK Wind PLC); Greencoat had been initially capitalised with a cornerstone stake and co-investment.

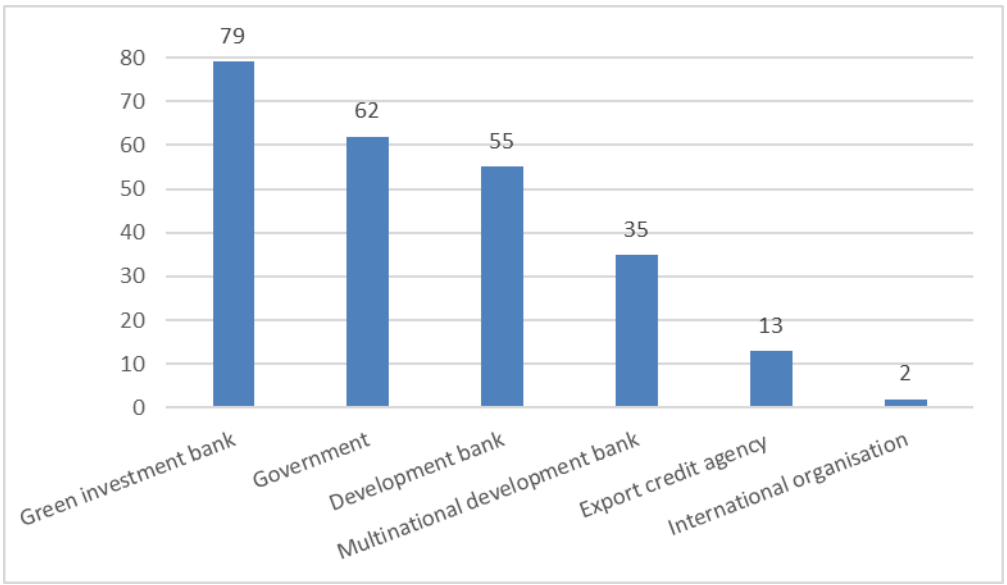
3.3. Public actors and institutional investor types

Public interventions in the database stem from a range of public actors, encompassing organisations whose core business activity may not be financing sustainable infrastructure. Dedicated sustainable finance actors, however, are the main drivers of trends reflected in the database. Public actors in the present sample have been categorised into 6 broad types: government and public authorities (from state to municipal level), national development banks, green investment banks, multilateral development banks, export credit agencies and international organisations. The latter category is an addition compared to the 2016 Progress Report.

The most active public actors in the sample were Green Investment Banks, and particularly the UK Green Investment Bank, closely followed by Government (see Annex A for definition) and National Development Banks (Figure 3.5)**.** Much of the Government and National Development Banks activity is in countries that do not have a Green Investment Bank. In these countries the government or their national development banks seem to perform some of the functions of a Green Investment Bank. Note that while the employed data research approach ensures the greatest possible comprehensiveness given the available data sources, the database cannot claim to be comprehensive or free from bias towards easily accessible data which could drive the finding on GIBs.

Figure 3.5. Public actor split

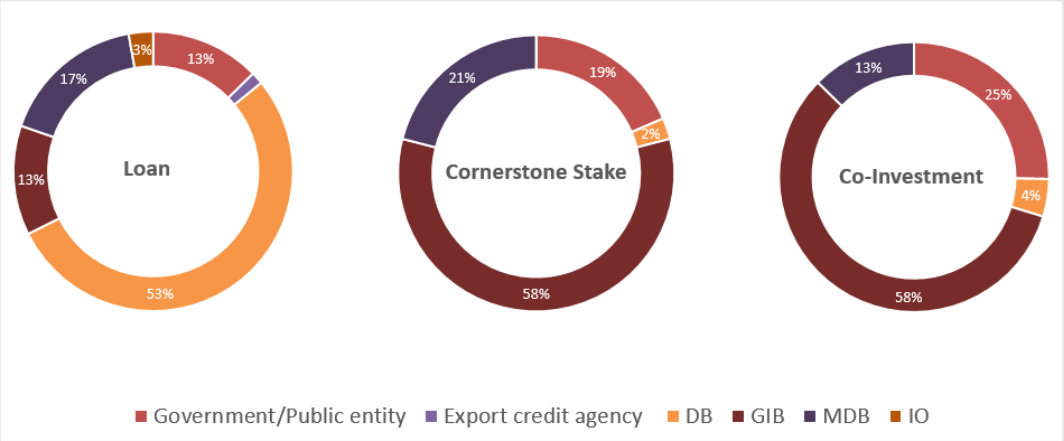
Reported as instances involved in projects



Source: Authors.

The different public actors prefer different risk mitigants to different degrees, even for the three more common risk mitigants. Figure 3.6 shows the shares of the number of instances an actor type has used loans, cornerstone stakes and co-investments. It shows that loans are preferred by development banks, while cornerstone stakes and co-investments are a preferred instrument of GIBs.

Figure 3.6. Share of risk mitigants deployed by public actor type



Source: Authors.

Cornerstone stakes by public actors could be an effective tool to foster new markets and leverage institutional capital. The presence of the UK Green Investment Bank (UK GIB) drives the high numbers for GIBs and for the United Kingdom in the database and, to a lesser extent, the strong presence of the wind sector in the database[11]. In the sample, the chief drivers of renewable electricity and energy efficiency investments in the United Kingdom are funds capitalised by anchor investments from the UK GIB and private sector finance. The active presence of the UK Greencoat Wind PLC (Fund) in the onshore wind space further contributes to the large number of observations. The UK GIB co-invested in the fund, which also benefitted from a cornerstone stake by the UK Department for Business, Innovation & Skills (UK BIS). In 2015, the UK BIS completely divested from the fund, citing that a secondary market for operational wind farms had been firmly established in the UK. Strong institutional investor interest in the fund continues to be observed even after 2015. Similar use of cornerstone stakes can be observed by the Clean Energy Finance Corporation (CEFC) in Australia. CEFC's anchor investments in the Palisade Renewable Energy Fund, in climate bonds and green asset backed securities by domestic issuers are geared towards attracting institutional capital and fostering the renewable energy infrastructure market (see Annex B).

Innovative deployment of de-risking and facilitating tools and techniques and collaboration between public actors could be effective approaches to credit enhance projects. The combined use of instruments potentially attracts not just institutional investors but also other public actors that help further reduce risk and achieve higher leverage. For example, for the Beloporozhskaya HPP's small hydro plants in Russia, the Russian Federal Corporation for the Development of Small and Medium-Sized Enterprises provided a RUB 4.07 billion guarantee on a RUB 8.15 billion joint loan by the International Investment Bank (IIB) and the Eurasian Development Bank (EBD). The risk distribution allowed by the public intervention attracted investments from the Russian Direct Investment Fund (RDIF) and undisclosed Middle Eastern sovereign wealth funds, among others. Box 3.1 and 3.2 highlight further examples of innovative syndication and credit enhancement by public actors.

[11] For more information on the UK GIB and other green investment banks, see (OECD, 2016[25]).

Box 3.1. Scaling-up institutional investment through innovative syndication

The IFC "Managed Co-lending Portfolio Programme"

The IFC's Managed Co-lending Portfolio Programme (MCPP) focuses on mobilising private investment in infrastructure assets in emerging economies, through portfolios diversified across sectors and countries. The MCPP operates as a platform to syndicate loans from institutional investors and co-invest them alongside principal investments of the IFC. The MCPP follows a blind pool approach wherein investors commit capital and define investment parameters like sector and geography. In return they gain access to IFC's pipeline of bankable projects and project origination and preparation capabilities. The IFC then designs a portfolio, in line with investor specifications, and uses investor capital alongside and on the same terms as its own. Investments under the MCPP can follow three approaches:

- **Trust Funds:** Investor capital is held as a trust fund with the IFC as the trustee. The Fund invests alongside the IFC by issuing senior debt. In 2013, State Administration for Foreign Exchange, China and the Hong Kong Monetary Authority committed USD 3bn to the IFC trust fund structure under the MCPP.
- **Investment Vehicles:** Investor capital is packaged into an investment vehicle like an infrastructure fund. The vehicle co-lends with the IFC, subscribing to senior tranches of project debt while the IFC takes a subordinated position. **The MCPP Infrastructure Fund**, for instance, invests capital committed by Allianz, AXA and Prudential in senior loans. IFC invests in a first-loss junior tranche with a partial guarantee by the Swedish International Development Agency (SIDA) to credit enhance the vehicle.
- **Credit Mobilisation:** Credit mobilisation pertains to risk-sharing arrangements with insurance companies that allow the IFC to mitigate part of the risk of its own investments and enhance its financing capacity. As partners of the MCPP, Liberty Mutual, XL Catlin, Munich RE and Swiss Re provide partial credit risk insurance on the loans issued by the IFC.

The MCPP provides a working example of the use of co-investment as a risk mitigant and showcases its efficacy in attracting institutional investor capital. Though the remit of the MCPP goes beyond sustainable infrastructure, it demonstrates an effective mechanism to channel low-risk seeking capital towards desired sectors. Through the MCPP, the IFC estimates it can achieve a leverage of 10:1.

Sources: *www.ifc.org/wps/wcm/connect/a5affca5-d77d-4fec-8804-97df4f036f13/MCPP+Infrastructure+Flyer+2018.pdf?MOD=AJPERES*,

www.ifc.org/wps/wcm/connect/7d132430-722a-43f2-8dc4-b3e5e0bccdb0/Credit+Mobilization+Flyer+2018.pdf?MOD=AJPERES,

www.ifc.org/wps/wcm/connect/756a1ed7-ea19-4d5d-b4a7-687a0858cde8/EMCompass+Note+36+MCPP+FINAL+3-29.pdf?MOD=AJPERES.

A subsample of observations in the database has available information on the type of institutional investor in the transaction, which shows that pension funds are the most dominant type, followed by insurance companies. This is unsurprising given the size of these types of institutional investors in terms of overall AUM. While the dataset has some information on institutional investors, overall data availability does not allow for a detailed analysis of the involvement of single types of institutional investors. Unambiguous information on the involved type of institutional investor exists for only less than half of the sample.

Box 3.2. Scaling-up institutional investment through innovative credit enhancement

IIFCL-ADB Credit Enhancement Scheme

To catalyse the local currency bond market and channel institutional capital towards domestic infrastructure in India, the India Infrastructure Finance Co. Ltd. (IIFCL) partnered with the Asian Development Bank (ADB) to launch a credit enhancement scheme that refinances and transfers loans from the balance sheet of banks to that of institutional investors. Under the scheme, the IIFCL extends a partial loan guarantee to credit enhance the project while the ADB provides an irrevocable backstop guarantee hedging up to 50% of IIFCL's underlying risk. The first infrastructure bond to benefit from the scheme was issued by ReNew Wind Energy in 2015 to refinance debt of a wind project. The bond was wholly underwritten by the Indian Infrastructure Development Finance Company (IDFC) and privately placed with institutional investors. In 2016, Hindustan Solar issued the second credit enhanced bond under the scheme to refinance a solar plant. The bond issuance was underwritten by YES bank and privately placed with institutional investors. IIFCL has sanctioned seven more projects in 2016-2017.

EBRD-MIGA Elazig Hospital Credit Enhancement

Developed under Turkey's Health Transformation Programme, the Elazig hospital was credit enhanced by an innovative risk mitigation instrument developed by the European Bank for Reconstruction and Development (EBRD) and the Multilateral Investment Guarantee Agency (MIGA). The credit enhancement was comprised of two unfunded subordinated liquidity facilities and a political risk guarantee. The EBRD provided a construction support facility, covering counterparty risk during the construction phase, and a revolving revenue support facility, insuring against non-payment of availability payments during the operation phase, while the MIGA hedged risks of expropriation, currency inconvertibility and breach of contract via its political risk guarantee. The enhancement allowed issuance of Turkey's first greenfield infrastructure project bond with a rating two notches above that of the sovereign. Long-term investors subscribed to the two enhanced tranches of the issue while the IFC co-invested in the unenhanced tranche as a cornerstone investor.

Sources: *www.adb.org/news/groundbreaking-adb-facility-mobilize-finance-critical-india-infrastructure,*

www.business-standard.com/article/companies/adb-ties-up-with-iifcl-for-credit-rating-enhancement-facility-112092100149_1.html,

www.gihub.org/resources/showcase-projects/showcase-project-elazig-hospital/,

www.ebrd.com/work-with-us/projects/psd/elazig-hospital-pppp.html.

4. Summary and implications for future research

This report endeavours to update an OECD database on institutional investment for sustainable infrastructure as well as the analysis based on it the database. It gives an overview of institutional investments in environmentally sustainable infrastructure and how public actors are working to scale up these investments.

Institutional investment in sustainable infrastructure is small, but growing. It could contribute, along with banks and other financial actors, to provide the additional financing needed to meet climate change objectives and the SDGs. However, the supply of projects has to fit the demand, i.e. the risk-return appetite, of institutional investors.

Public interventions at the project level can help make sustainable infrastructure projects more attractive to institutional investors. Public actors can help, for example, by reducing risks, reducing search costs for projects and partners or by helping scale projects to an appropriate size for investors including institutional investors (OECD, 2017[19]; Ang, Röttgers and Burli, 2017[13]; Prag, Röttgers and Scherrer, 2017[21]).

This report tracks and analyses institutional investments with project level interventions. To do so, the underlying database extends the number of observations to 152 and refines terms to help ensure comparability and ease of analysis. It also adds previously unrecorded de-risking and facilitating tools and techniques, catalogues the different types of public actors observed and widens the sector scope for sustainable infrastructure projects.

Based on this data, the analysis shows that public actors support institutional investments using a variety of financial instruments. While well-established instruments such as loans and cornerstone stakes are dominant, the data show signs of innovation, both in use of instruments and also targeted projects. In addition to using established financial instruments, the green investment banks reflected in the database use a range of other tools and techniques. This shows the willingness of green investment banks to cater to the needs of investors, and that these institutions have the level of expertise necessary to experiment. Such experimentation could provide insights and capacity building and serve as a basis for future financing activities.

Institutional investors covered by this database most often use intermediated investments at present. Efforts to increase institutional investment in sustainable infrastructure should take this into account, while noting that some direct investments by institutional investors are occurring with public intervention.

Available data sources currently show gaps with respect to projects involving institutional investors. Data is scarce or non-existent for institutional investments where these are not made directly but rather through investments funds or other vehicles. Similarly, currently available data does not show the stage of the project at which investors enter. Information on project stage would be highly relevant, however, since these affect an investor's willingness to enter a transaction, and the ability of a project intervention to be effective. Therefore, collecting and analysing data on deal structure (including project stage) could be a useful topic for future research. Similarly, a focus on other commonly involved actors such as banks and venture capital (for newer technology) could be useful.

Methodology and definitions

The goal of this database is to provide comparable and detailed observations for institutional investment in sustainable infrastructure involving public interventions. To

ensure comparability of observations and streamline data collection, data research has to be based on strict working definitions of both *institutional investment* and what a *public intervention* is in this context.

The data collection effort is a systematic bottom-up approach, designed to achieve the highest number of comparable observations at a level of detail showing financial instruments and actors involved in G20 countries between 2000 and 2018 (time of deal closure). While ultimately the database cannot claim to be comprehensive, the employed overlapping approaches ensure the greatest possible comprehensiveness given the available data sources and expected data detail.

The first step of the bottom-up approach is to survey available infrastructure databases for involvement of institutional investors and public actors, and to add and correct information where necessary and available. Specifically, the database starts with a review of projects reported in (BNEF, 2018[22]; IJGlobal, 2018[23]). To amend the detail of the observations, especially on projects that are not in the renewable electricity category, the database also includes primary data research. Primary data research also helped to include additional observations not at all or only scarcely included in proprietary databases. Similar to the underlying proprietary databases, and even despite additional primary research, the database cannot claim representativeness, let alone comprehensiveness. For this narrow set of infrastructure projects no global investment numbers exist to compare to.

This database defines a project as an **institutional investment** if:

- either at least one of the actors is an institutional investor of the kind *insurance company*, *pension fund*, *pension reserve fund* or *sovereign wealth fund*, or
- at least one of the investors is an investment fund, i.e. a climate or renewable energy fund, confirmed to be financed by at least one institutional investor of the above 4 kinds.

An institutional investment can be called *institutional investment with public intervention* if a public financial actor makes a *project-level* intervention with the aim to de-risk the project(s) or otherwise enable institutional investment by either financing a project, directly or through intermediation, or backing a project with financial instruments using public finance. Public financial actors are defined as government, i.e. domestic, regional or international, development finance institution or any other actor capitalised wholly or mostly by public funds.

Note that these definitions exclude the majority of sustainable investments. Notably, the above definition does not by default include projects financed by policy-level interventions, such as support from feed-in tariffs or tenders. Neither does it include projects financed by state-owned enterprises. While state-owned enterprises might be backed by public financial actors, which might have an indirect effect on investments, these financial actors do not provide finance with the *aim* to de-risk or otherwise enable projects.

This database follows the framework for investment pathways and channels outlined in OECD (2015[10]) and records attributes listed in Box A.1. Institutional investors, like other investors, have manifold ways to invest in projects. To bring a useful order to the myriad approaches to investment, OECD (2015[10]) distinguishes on the basis of four major bifurcations: How direct the investment is (direct, intermediated or indirect), if the investment is listed or unlisted (i.e. traded publicly), the type of capital used (equity or debt) and if it is project or internal investment. As this database covers project-level interventions

only, it includes only project investments. All other pathway distinctions are covered, leading to the 5 different pathways of investment presented in the main body of this paper.

Box A.1. Attributes recorded in the database

- Project names
- Category, sector and subsector
- Country and year
- Equity and debt providers
- Involved banks
- Transaction type
- Investment channel used
- Public actors involved
- Institutional investor involved
- Risk mitigants
- Transaction enablers

To classify the public interventions, the database distinguishes between *risk mitigants* and *transaction enablers*. For the database, risk mitigants are defined as either a direct use of public finance or as backing a project with public funds such that public funds are at risk. In short: risk mitigants are enabling interventions that are not merely catalytic; the public actor has a contingent liability. Transaction enablers are defined as interventions by a public entity that do not finance the project directly or put funds at risk related to the success of the project, but provide a helpful service that in itself is not part of the project. In short, transaction enablers are purely catalytic.

Annex A. Select examples of green bonds and green securitisation

Many channels use bond structures, e.g. green (or social) bonds. Including bonds in this database comes with restrictions. Though bond transactions are often reported, the underlying projects rarely are. Even if single projects are reported in a bond transaction, if multiple investors are involved, it is hard to attribute the institutional investment to all projects, especially if the institutional investor was a minor holder. Due to these restrictions the database includes only bonds for single projects for which information on actors is available and clear. For additional information covering the green bonds market for institutional investments with public intervention, see select examples below:

Transaction	Year	Country	Bond Type	Standard	Category	Sector	Investors	Public Intervention		
								Actor	Risk Mitigant	Transaction Enabler
National Australia Bank green residential mortgage-backed security	2018	Australia	Green Residential Mortgage Backed Security	Climate Bond Standard (CBI)	Energy Efficiency	Low-carbon buildings	Clean Energy Finance Corporation (CEFC), undisclosed institutional invetsors	CEFC	Cornerstone Stake	
KommunKredit green bond	2018	Denmark	Green Bond	Green Bond Principles (ICMA)	Multiple	Multisector	APG Asset Management, ACTIAM N.V, undisclosed investors	KommunKredit		Warehousing and pooling

Transaction	Year	Country	Bond Type	Standard	Category	Sector	Investors	Public Intervention		
								Actor	Risk Mitigant	Transaction Enabler
Kommunivest green bond	2018	Sweden	Green Bond	Green Bond Principles (ICMA)	Multiple	Multisector	Affirmative Investment Management, AI Pension, AP7, Blackrock, Danske Capital, the Folksam Group, Länsförsäkringar Bank, Nordea Asset Management, PostFinance AG, Raiffeisen KAG, SEB Asset Management, Swedbank Robur, Öhman Asset Management	Kommuninvest		Warehousing and pooling
KommunKredit green bond	2018	Denmark	Green Bond	Green Bond Principles (ICMA)	Multiple	Multisector	APG Asset Management, ACTIAM N.V, undisclosed investors	KommunKredit		Warehousing and pooling
Commonwealth Bank of Australia climate bond	2017	Australia	Climate bond	Climate Bond Standard (CBI)	Energy Efficiency, Low-carbon Mobility		Clean Energy Finance Corporation (CEFC), undisclosed institutional investors	CEFC	Cornerstone Stake	
FlexiGroup climate bond	2017	Australia	Green Asset Backed Security	Climate Bond Standard (CBI)	Renewable Energy	Solar	Clean Energy Finance Corporation (CEFC), undisclosed	CEFC	Cornerstone Stake	

Transaction	Year	Country	Bond Type	Standard	Category	Sector	Investors	Public Intervention		
								Actor	Risk Mitigant	Transaction Enabler
							institutional investors			
Investa Office Fund green bond	2017	Australia	Green bond	Climate Bond Standard (CBI)	Energy Efficiency	Low-carbon buildings	Clean Energy Finance Corporation (CEFC), undisclosed institutional investors	CEFC	Cornerstone Stake	
Investa Commercial Property Fund green bond	2017	Australia	Green bond	Climate Bond Standard (CBI)	Energy Efficiency	Low-carbon buildings	Clean Energy Finance Corporation (CEFC), institutional investors	CEFC	Cornerstone Stake	
Kommunivest green bond	2017	Sweden	Green Bond	Green Bond Principles (ICMA)	Multiple	Multisector	Affirmative IM Partners, Amundi, AP Fonden, CalSTRS, Praxis Impact Bond Fund and SEB Investment Management	Kommuninvest		Warehousing and pooling
Westpac climate bond	2016	Australia	Climate bond	Climate Bond Standard (CBI)	Energy Efficiency	Low-carbon buildings	Clean Energy Finance Corporation (CEFC), undisclosed investors	CEFC	Cornerstone Stake	
FlexiGroup climate bond	2016	Australia	Green Asset Backed Security	Climate Bond Standard (CBI)	Renewable Energy	Solar	Clean Energy Finance Corporation (CEFC), undisclosed investors	CEFC	Cornerstone Stake	

Transaction	Year	Country	Bond Type	Standard	Category	Sector	Investors	Public Intervention		
								Actor	Risk Mitigant	Transaction Enabler
Monash University climate bond	2016	Australia	Climate bond	Climate Bond Standard (CBI)	Multiple	Multisector	Clean Energy Finance Corporation (CEFC), undisclosed investors	CEFC	Cornerstone Stake	
Kommunivest green bond	2016	Sweden	Green Bond	Green Bond Principles (ICMA)	Multiple	Multisector	Alecta, AP3, AP7, Danske Capital, Folksam Group, Nordea Asset Management, KfW, SBAB, SPP Storebrand, Öhman Asset Management	Kommuninvest		Warehousing and pooling
Kommunivest green bond	2016	Sweden	Green Bond	Green Bond Principles (ICMA)	Multiple	Multisector	AP3, AP4, CalSTRS, Erste Asset Management, Everence Financial, NIB, Raiffeisen KAG, SBAB Treasury, SEB Investment Management, United Nations Joint Staff Pension Fund	Kommuninvest		Warehousing and pooling
Renew Financial and Citi energy efficient loan asset backed security	2015	United States	Green Asset Backed Security		Energy Efficiency	Low-carbon residential buildings	Calvert Investments	Pennsylvania Treasury Department, United States Department of Energy	Co-investment	Warehousing and pooling, Syndication platform

Transaction	Year	Country	Bond Type	Standard	Category	Sector	Investors	Public Intervention		
								Actor	Risk Mitigant	Transaction Enabler
National Australia Bank climate bond	2014	Australia	Climate bond	Climate Bond Standard (CBI)	Renewable Energy		Clean Energy Finance Corporation (CEFC), undisclosed investors	CEFC	Cornerstone Stake	

Annex B. Glossary

Explanations of these terms are very condensed and may not be complete, and are not considered to necessarily reflect the official position of the OECD. Sources used include, *inter- alia*, Duke University's Hypertextual finance Glossary; Brealey, Myers and Allen (2014) and Investopedia.com.

Bankable: Projects that have sufficient collateral, probability of success, and predictability of future cash flow, to be acceptable to prospective financiers.

Basel III: The third version of the Basel Accords agreed upon by 27 countries on 12 September, 2010. Among the highlights was the increasing of Tier 1 capital from 2% to 4.5% and the addition of a buffer of 2.5%. The assets that qualify for capital were also redefined. The full implementation of the accord is not due until 2023. Basel I is the Agreement concluded among country representatives in 1988 in Basel, Switzerland to develop standardised risk-based capital requirements for banks across countries. The Accord is also known as the 1988 Basel Accord and it primarily focused on credit risk and is now viewed as outdated. Basel II is currently in the process of implementation.

Benchmark: The performance of a predetermined set of securities, used for comparison purposes. Such sets may be based on published indexes or may be customised to suit an investment strategy.

Co-investment: Public actor(s) invest alongside private investor(s) with either debt or equity with an equal or lower stake than a private investor (any larger investment would be classified as cornerstone stake).

Cost of capital: The cost of funds used for financing a business. Cost of capital depends on the mode of financing used – it refers to the cost of equity if the business is financed solely through equity, or to the cost of debt if it is financed solely through debt. Many companies use a combination of debt and equity to finance their businesses, and for such companies, their overall cost of capital is derived from a weighted average of all capital sources, widely known as the weighted average cost of capital (WACC). Since the cost of capital represents a hurdle rate that a company must overcome before it can generate value, it is extensively used in the capital budgeting process to determine whether the company should proceed with a project.

Credit enhancement: Reducing the credit or default risk of a debt, thereby improving its credit-worthiness and increasing the overall credit rating

Credit rating: Credit rating refers to an evaluation of individual's or company's ability to repay obligations or its likelihood of not defaulting. If credit rating is downgraded, it would increase the cost of capital due to the extent that the reward for such risky assets would be necessary as risk-premium.

Feed-in tariff (FiT): A fixed price per kWh of electricity which is paid to the producer by the system operator.

Fund: An investment company that invests the funds which are aggregated and pooled from individual investors for a fee. Investment fund gives individual investors access to a wider range of financial products than investors themselves would have been able to access.

Green investment bank: Broadly defined as a public entity established specifically to facilitate and 'crowd-in' domestic private low-carbon climate-resilient infrastructure investments through different activities and interventions.

Illiquid: In the context of investments the term illiquid describes a thinly traded investment such as a stock or bond that is not easily converted into cash. Illiquid securities have higher transactions costs.

Infrastructure fund: Investment fund that is established to invest in infrastructure assets.

Investment bank: An investment bank traditionally facilitates transactions of all types in the wholesale financial markets (transactions conducted by corporations, businesses, institutional investors, and high net worth individuals) including mergers and acquisitions (the purchase and sale of businesses and their assets), capital raising or 'underwriting' (of equity, debt, etc.) on behalf of corporations or their shareholders. They may provide ancillary services such as market making, trading of derivatives, securities, and other financial instruments, investing and lending, asset management, and FICC services (fixed income instruments, currencies, and commodities). This excludes retail brokerage, retail lending, or any other practice that centres on 'unaccredited investors'

Leverage: The use of debt financing, or property of rising or falling at a proportionally greater amount than comparable investments.

Liquidity: In context of a corporation, the ability of the corporation to meet its short-term obligations. In context of securities, a high level of trading activity, allowing buying and selling with minimum price disturbance. Also, a market characterised by the ability to buy and sell with relative ease.

Long-dated liabilities: A section of the balance sheet that lists obligations of the company that become due more than one year into the future.

Project bond: Private debt issued by a project company to finance a specific off-balance-sheet project. Project bonds are an asset-based form of financing.

Risk mitigant: Risk mitigants are defined as either a direct use of public finance or backing a project with public funds which puts public funds at risk. In short, the public actor has a contingent liability.

Securitisation: The process of transforming illiquid financial assets into tradable products.

Transaction enabler: Transaction enablers are defined as interventions by a public entity that do not finance a project directly or put public funds at risk, but facilitate investment from other actors private or public. Transaction enablers are purely catalytic and no contingent liability is assumed by public funds.

Underwriting: In the case of loans, underwriting is the process by which a lender decides whether a potential creditor is creditworthy and should receive a loan. For securities issuances, underwriting is the procedure by which an underwriter, such as in investment bank, brings a new security issue to the investing public in an offering. In such a case, the underwriter will guarantee a certain price for a certain number of securities to the party that is issuing the security (in exchange for a fee). Thus, the issuer is secure that they will raise a certain minimum from the issue, while the underwriter bears the risk of the issue.

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