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A quantitative analysis of 10 multilateral development banks' investment in conventional and renewable power generation technologies from 2006 to 2015

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Abstract:

Multilateral development banks (MDBs) play a pivotal role in the financing of electricity-generation projects in developing countries, thus having a major impact on the emission pathways of these countries. While information about the MDBs' investments is publically available it is dispersed and hard to compare. A comprehensive compilation of all MDBs' power generation investments over the years has been missing. To address this gap, here we assess power generation financing by all 10 relevant MDBs during 2006–2015, in different regions, and through different branches of the banks. The study assesses technology choices by compiling a bottom-up dataset drawing information from 841 projects and programmes. We find that MDBs financed a major portion of all power-generation growth in the developing world, with an increasing share of renewables. However, MDBs have 'greened' their portfolios to different extents, and the activities of their public and private-sector branches differ substantially.

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1. Introduction

With increasing economic activity, developing countries' electricity demand is growing rapidly¹. This requires vast investments, which have been estimated at 2,700 billion USD during 2017–2025 for power plants alone². Whether these investments flow to fossil fuel-based or renewable energy-based technologies (RET) determines whether these countries develop based on a high- or low-carbon electricity trajectory^{1,3}. Given the high investment risks that investors face in developing countries^{4–7}, public finance plays an important role here. For developing countries with their constraint public budgets⁵, especially multilateral development banks (MDBs), such as the World Bank, are considered key actors^{8–13}. Given their broad mandates and large investment volumes, MDBs are the most important international financial institutions supporting capital investments in many developing countries^{14,15}. These banks do not only provide their own capital, but – as many public banks – attract private co-investors^{16–18}.

MDBs have been financing power-generation projects in developing countries for more than 50 years, mainly for the development of coal, gas, and large hydropower plants¹⁹. Since during 1999–2000, MDBs began formulating strategies for moving their investment portfolios towards low-carbon technologies^{11,20}. Later, six major MDBs formally pledged to strongly increase their climate financing^{12,21}. At the same time, though, MDBs keep financing fossil-fuel-based power plants under their mandate for economic development and energy security^{10,22,23}. Also, support for RET competes with other policy areas of the banks, such as agriculture, health, and education. Hence the overall impact of MDBs on the deployment of different power generation technologies (i.e. the 'net effect' from financing both renewables and fossil-fuel plants) is ambiguous^{9,10,22–25}. While MDBs report jointly on climate finance including the category 'renewable energy' since 2011²⁶, these aggregated numbers are not appropriate for more detailed analyses on power-generation financing (and fossil fuel-plants are not covered in climate finance reporting). The international OECD development aid data covers MDBs, but detailed information on power generation activities lacks completeness (see Supplementary Note 1). Previous independent analyses from researchers and non-governmental organizations are also quite limited regarding the technologies and banks under study, due to the challenge of achieving accurate project-level data (see Supplementary Table 1)^{10–12,23–25}. In sum, despite the key role attributed to MDBs in fostering the deployment of RETs, their impact on the global deployment of low- and high-carbon power generation technologies is poorly understood.

Here, we assess power generation financing by all 10 relevant MDBs during 2006–2015 and distil their role with respect to the deployment of different technologies, in different regions, and through different branches of the banks. The study draws on a newly constructed dataset of 841 projects and programmes, based on an analysis of 1,751 documents provided by the banks as well as secondary information and expert interviews. While the main text of this article (sections 2–7) focusses on the results, the underlying methods are explained in an appendix (starting on page 11). Supplementary supporting information is provided in a separate file and referenced in the text accordingly.

We find that MDBs were instrumental to the new power-generation capacity of low- and lower-middle-income countries, particularly those in Africa. Several MDBs have built a large portfolio of RET projects,

on top of their financing towards fossil-fuel plants, thereby increasing the total MDB investment in power generation. Importantly, though, activities of MDBs via their public- and private sector branches differ substantially, with public-sector lending used mainly in non-renewable and hydropower projects. Results are presented in four steps: First, we describe the relevant MDBs and their investment activities. Second, aggregate MDB financing and its impact on the deployment of power generation capacities is discussed. Third, we compare the financing dynamics between banks, and fourth highlight differences between their public- and private sector branches. We conclude with implications for policy and future research.

2. Assessing investments by MDBs

Here we analyse banks of three types, namely members of the globally-active World Bank Group (i.e. the World Bank [WB; operating formally through the International Bank for Reconstruction and Development, and the International Development Association], the International Finance Corporation [IFC] and the Multilateral Investment Guarantee Agency [MIGA]), regional development banks (i.e. the African Development Bank [AfDB], the Asian Development Bank [AsDB], the European Bank for Reconstruction and Development [EBRD], activities outside the European Union (EU-28) from the European Investment Bank [EIB], and the Inter-American Development Bank [IADB]), and the special case of regional 'South–South' development banks that do not include donor countries from the global North among their shareholders and boards (i.e. the Development Bank of Latin America [CAF] and the Islamic Development Bank [IsDB]). These 10 banks cover all the relevant MDB activities supporting power generation during the period under study. Sub-regional banks were not included, as they typically focus on other investment areas, and the newly formed 'BRICS bank' (NDB) and Asian Infrastructure Investment Bank (AIIB) started operating in 2016¹⁵.

Reflecting the varying economic structures in developing countries, most MDBs lend to both the public and private sectors, typically through separate branches. Differentiating the role of MDB in the deployment of various power-generation technologies through their public- and private-sector branches, as well as assessing the impact of MDB activity on power-generation capacities, requires project-level information. We exploit the fact that as public institutions, most MDBs are subject to an 'access to information' regulation, which requires them to make certain documents, such as project appraisal reports and environmental/social reviews, available to the public after a project is signed. However, these documents differ greatly in structure, content and detail. For the present study, we created a consistent database of RET and fossil-fuel projects across all relevant MDBs by manually coding 1,751 project documents, complemented by a broad set of secondary information sources (see Methods). We focused on projects that provide capital (e.g. loans, grants, etc.) as opposed to pure capacity building. To assess the aggregated impact of MDB investment, the dataset has been enriched by the incremental capacity (i.e. MW capacity added) sourced from project data, company announcements and press reports. A crucial requirement was to prevent double-counting of projects that are co-financed by several MDBs, which we achieved by identifying such projects based on their locations and other parameters (see Methods).

3. Aggregate MDB financing and impact

The total MDB financial commitments to different power-generation technologies during 2006–2015 are shown in Figure 1. While the amounts have varied over the years, financing in real terms amounted to more than 6 billion USD₂₀₁₅ each year since 2007. The distribution between technologies also shows considerable changes over time. Hydropower has been an important technology throughout the years, resulting in a 36–76% share of renewables over the period (the lowest share in 2009 is explained by the exceptionally high amount of coal financing in South Africa, while the highest share in 2011 denotes the financing of large hydropower projects in Asia and Latin America). While hydropower plays an important role for low-carbon power generation, the potential for additional capacity is limited in many countries. Hence the expansion of less mature RETs, such as wind turbines and solar PV is of particular importance to decarbonizing power systems²⁷; therefore, we considered non-hydro renewables as a separate category. As shown in Figure 1, the share of non-hydro renewables in MDB investment has risen steadily, from a low of 9% in 2007 up to ~50% in 2013 and beyond. Hence, the extent of MDB financing towards RET has increased significantly, both in absolute terms and relative to fossil fuel-based technologies. This development is in line with the strong decrease in cost especially for solar PV and wind power during that decade, enabled by global public policy support for low-carbon innovation and deployment.^{28,29}

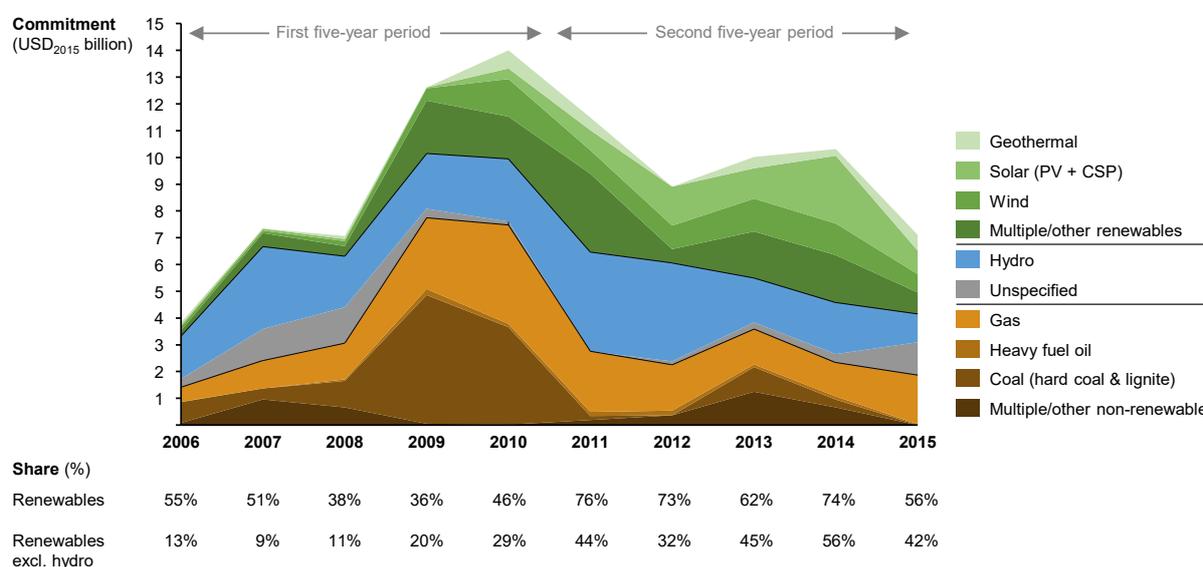


Figure 1: Annual total financial commitments to power-generation technologies by multilateral development banks. Areas show the sum of commitments across MDBs (converted to USD₂₀₁₅), with colours indicating different technologies. Commitments include all types of financial instruments, except for guarantees. The percentages describe the share of annual commitments dedicated to all RETs and non-hydro RETs only, respectively.

Over the 10-year period under study, about 40% of the MDB investments in fossil fuel-based technologies and hydropower went to brownfield projects (i.e. extensions or refurbishments of existing plants; see Supplementary Figure 1). The other 60% went to greenfield projects at new sites, though the greenfield share of fossil-fuel projects has decreased over time, from 68% during 2006–2010 to 48% during 2011–2015. For non-hydro renewables, approximately 90% of the investments went to greenfield projects across the entire period. In terms of the financial instruments used, there were hardly any differences between technologies (see Supplementary Figure 2); the lion's share was provided via debt (~90% across years and technologies), with the remainder distributed between equity, grants (primarily for renewables) and Islamic finance instruments (i.e. contracts that are compliant with Islamic law³⁰).

From a global perspective, MDB investment of 7–14 billion USD per year compares to total investment in power generation that has been estimated³¹ e.g. for 2015 at 95 billion USD in non-OECD countries except China, so MDBs accounted for roughly 10% of all investments. However, the impact of MDB financing is only partly reflected by this share, as international financial institutions are often instrumental in attracting additional public or private investors (given their expertise and the political umbrella they provide)¹⁶. Hence, we compare the growing power-generation capacities in developing countries with capacity additions triggered by MDB-financed projects. During 2007-2015, the MDBs jointly were involved in estimated capacity additions of 118 GW, thereof 31 GW hydro plants and 23 GW of other renewables. Figure 2 provides percentages of estimated MDB involvement in financing different technologies, both by region and income group. Despite some uncertainties regarding global capacity data (see methods), these results underline the importance of MDB financing for capacity additions, particularly in countries within the lowest income group, many of which are in Sub-Saharan Africa. The figure also highlights the differing roles of MDBs across technologies and regions, with particularly high involvement in hydropower projects (e.g. 60% in South Asia) as well as fossil-fuel technologies and non-hydro RETs in Sub-Saharan Africa (81% and 61%, respectively).

4. Technology portfolios of individual MDBs

For greater detail on MDB investments in different technologies, Figure 3 provides the financing volumes of individual banks (see also Supplementary Table 2). Each MDB has invested at least 5 billion USD₂₀₁₅ during 2006–2015, with the World Bank Group (including the IFC) responsible for 33% of the total volume and the regional MDBs accounting for the other 67%. The total financing volumes of each bank were split into five-year periods (i.e. 2006–2010 and 2011–2015) to highlight the shifts in their technology portfolios over time.

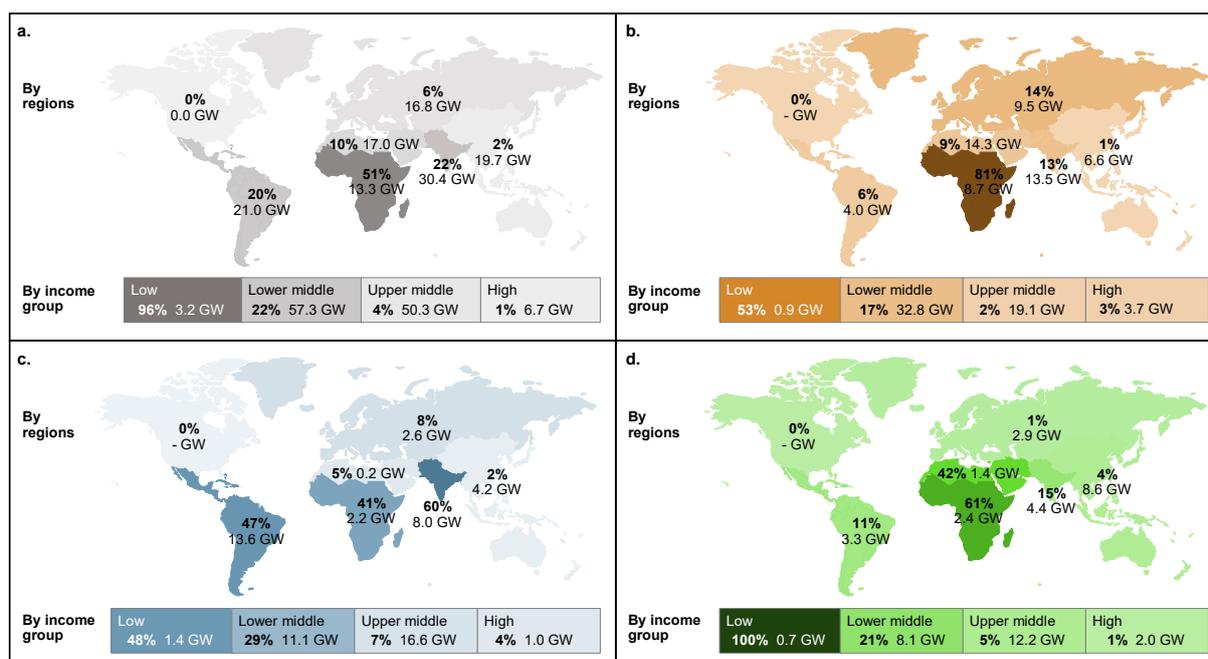


Figure 2: Share of power generation capacity added during 2007-2015 through projects with multilateral development bank participation. The panels show an estimate of MDB involvement in incremental power-generation capacity across (a) all technologies, (b) fossil-fuel technologies, (c) hydropower and (d) non-hydro RETs. ‘Involvement’ refers to projects co-financed by at least one MDB. The top part of each panel differentiates between regions, while the bottom part differentiates between income groups, both as defined by the World Bank. Numbers partly do not add up due to projects with unspecified technologies, and few countries with unspecified income group. See Methods for assumptions.

In comparing the portfolios, we observed four different patterns of investment and sorted the bank data accordingly. The first pattern applies to the EBRD and the EIB (both of which are mainly active in Eastern Europe, Central Asia and North Africa), the IADB (active in Latin America) and the World Bank Group’s private-sector branch, the IFC. These banks increased their financing of power-generation technologies by a considerable amount between the five-year periods, with almost all of the growth coming from projects using new RET. Thus, banks following the first pattern have built up a considerable portfolio in renewables on top of their financing of fossil fuel-based power plants, which either slightly decreased (EIB and IADB) or stayed relatively constant (IFC and EBRD). The second pattern, exhibited by Africa’s AfDB and the WB, also includes growth in renewables alongside a strong reduction in fossil-fuel based power plants; thus, these banks substituted some of the financing for conventional plants by financing for renewables (including hydropower in the case of the World Bank), with the overall funding amount being reduced at AfDB. For both of these banks, the first period (2006–2010) is characterized by the approval of large investments in coal plants, especially the 4.8 GW Medupi plant in South Africa—a pattern that was not repeated in the second period (2011–2015). In the third pattern, Asia’s AsDB shows a specific development, with the overall funding amount staying roughly constant and a significant part of financing being shifted within the renewables portfolio, from hydropower to new technologies RETs, especially solar and geothermal. Also Latin America’s CAF decreased its financing of hydropower and added more non-hydro renewables to its portfolio. Finally, the IsDB (active across Islamic countries) shows a distinct pattern of growth, mainly in its commitments to non-renewable technologies. During

2011–2015, most of the IsDB’s commitments to fossil-fuel projects were in Africa, where financing from other MDBs was significantly reduced.

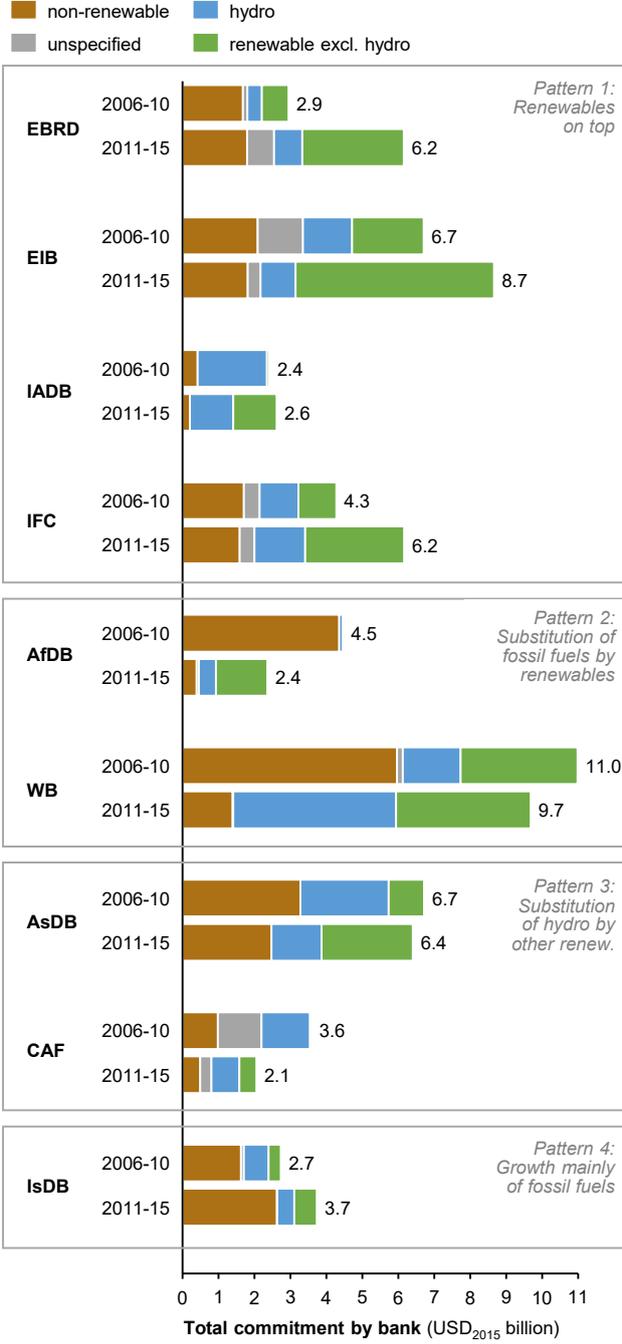


Figure 3: Total financial commitments to power-generation technologies by individual multilateral development banks. Each bar graph shows the total commitments by bank during two five-year periods (2006–10 and 2011–15), with a different colour representing each technology group. Commitments include all types of financial instruments, except for guarantees. Banks are grouped according to changes in their technology portfolios between the two periods.

5. Differences between public- and private-sector branches

In the final step of our analysis, we use the project-level data to differentiate financial commitments further, between the public and private sector arms of each MDB. Figure 4 shows the commitments of different branches of the World Bank Group. Regarding its public-sector lending, 42% of its commitments were allocated to non-renewable projects and 26% were assigned to non-hydro renewables. In the private sector, however, the WB and the IFC financed much higher shares of non-hydro renewables (75% and 36%, respectively). In contrast, guarantees handed out by the specialized MIGA branch used for non-hydro renewables only to a small extent.

The differences between the technology portfolios of the public- and private-sector branches are much larger among the regional MDBs (see Figure 5). Across all seven banks, the public-sector branches have a higher share of commitments allocated to fossil-fuel based power generation projects (except for the IADB), with a much smaller share assigned to non-hydro renewables. While the overall financing of non-hydro renewables increased over time, the different patterns between public- and private sector financing remained in place (see Supplementary Figures 3 and 4). As underlined in our concurrent interviews with bank officials (see Methods), this is not due to variations in internal policies among the banks' branches—the goal to shift investments from high- to low-carbon projects is typically defined for the entire bank. However, technology selection follows very different procedures between sectors. In public-sector branches, country strategies and projects are agreed upon between the bank and national governments; for power-generation projects, the MDB has to meet the investment priorities of the local authorities and accommodate their 'level of comfort' with new technologies (e.g. local governments often prefer fossil-fuel power plants). Within private-sector branches, a dynamic industry of private project developers, including an emerging segment of companies specializing in renewable energy, advance with projects that MDBs can finance if investment criteria are met.

Regarding the public-sector branches of 'South–South' development banks, the share of commitments to non-hydro renewables is particularly small. While the energy experts of these banks do engage in discussions on technology options with their national counterparties, these banks have little power in promoting low-carbon options (in contrast to the World Bank Group, which has more power due to its large financing volumes and political leverage). Non-hydro-renewable projects receiving funding via the public-sector branches of regional MDBs often include a grant component from concessional financing facilities, such as the Clean Technology Fund, which offers incentives to local governments to opt for a low-carbon solution.

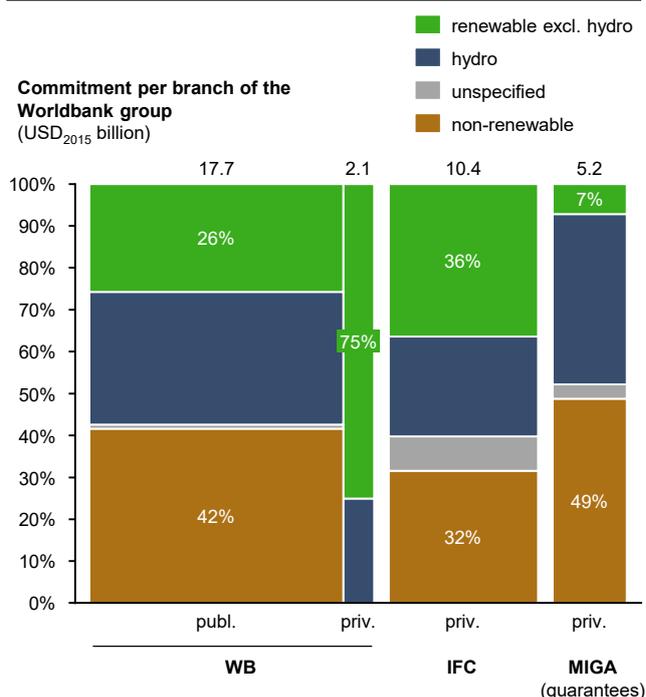


Figure 4: Financial commitments to power-generation technologies by branches of the World Bank Group. The width of the columns and the numbers at the top denote the commitments of MDBs by sector, which are differentiated between public and private borrowers for the WB (the IFC and the MIGA only deal with private borrowers). The shades and the percentages represent different technology groups. For the WB and the IFC, commitments include all types of financial instruments, except for guarantees. For the MIGA, all commitments are guarantees. Note: Excludes projects that do not clearly belong to one sector (mainly public–private partnerships for renewables excl. hydro financed by WB, ca. 0.8)

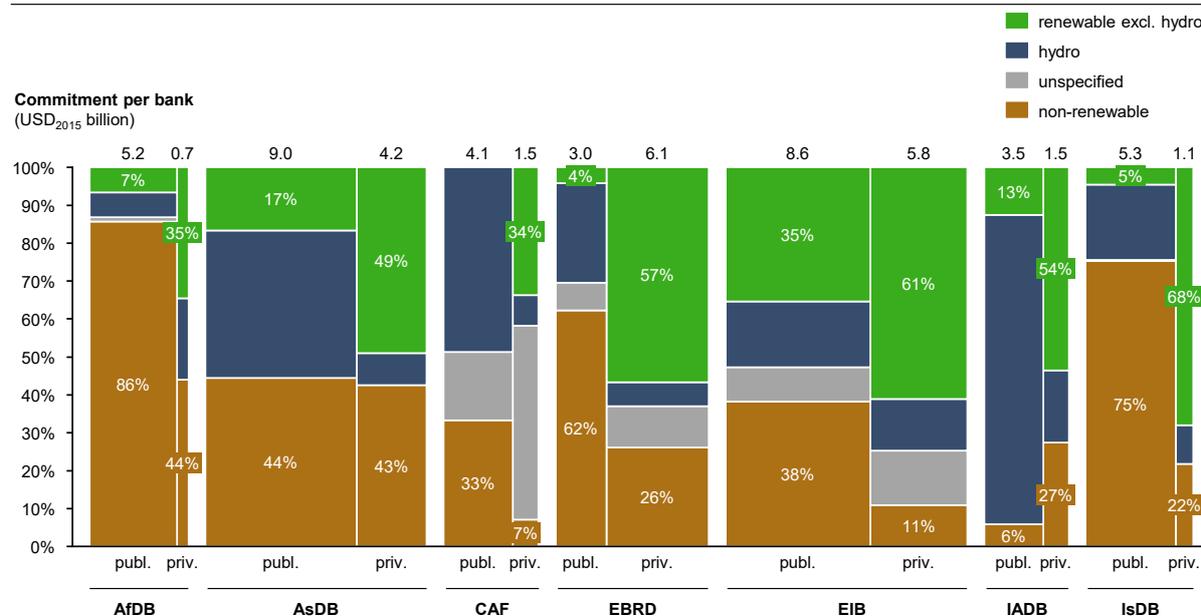


Figure 5: Financial commitments to power-generation technologies by branches of regional MDBs. The width of the columns and the numbers at the top denote the commitments of MDBs by sector (public vs private borrowers). The shades and the percentages represent different technology groups. Commitments include all types of financial instruments, except for guarantees. Note: Excludes projects that do not clearly belong to one sector (mainly public–private partnerships for renewables financed by AfDB and EIB, ca. 0.9 and 1.0, respectively).

6. Implications for public policy

The amount of financing that MDBs have provided to power-generation technologies over the last decade, as well as the capacity additions they have been involved with, confirm that MDBs are key actors in expanding the power-generation capacities of developing countries. Our analysis of the bottom-up project data reveals that changes in technology portfolios differ considerably between MDBs, with several banks (including heavyweights such as the EBRD, the EIB and the IFC) building a large RET portfolio 'on top' of their financing of fossil fuel-based technologies. While the increased financing volumes in RETs is encouraging, further action is required to simultaneously reduce the financing volumes committed to high-carbon technologies. Insisting that MDBs promote and finance (partly) renewable energy-based solutions, wherever feasible, should rank high on the agendas of MDB boards of governors and the broader climate-policy community, especially since RET like photovoltaics and wind turbines are now cost competitive in many contexts³².

Importantly, 'greening' the technology portfolio of MDBs will limit the climate-related financial risk exposure of the banks³³. Hence, conditional on the type of technologies financed by MDBs, climate policymakers might consider further extending MDB financing capabilities in the energy sector – e.g. through an increase of paid-in capital, or through a wider securitization of loans across MDBs^{34,35}. Another possibility to further leverage MDBs for accelerating the deployment of low-carbon RETs is concessional financing (i.e. providing government-funded facilities that MDBs can use to partially re-finance loans to RET projects). Interestingly, the vast majority of early financing for RET programs from the Green Climate Fund (GCF), which was established within the United Nations Framework Convention on Climate Change (UNFCCC), has accordingly be approved for projects brought forward by MDBs (89% of approvals 2015–2017, see Figure 6), despite 'direct access' for developing countries being a key principle of the GCF³⁶. Our analysis suggests that, for the GCF or other climate finance facilities, policymakers might consider the differences between the public- and private-sector branches of MDBs. Private-sector actors seem particularly swift at presenting bankable RET projects in the countries where they are active, and MDBs have proven effective at de-risking and financing such projects. While many countries have enacted regulations allowing for private investment in power generation since the 1990s³⁷, the energy sector in other countries will likely remain in the public domain for the foreseeable future. Therefore, convincing the local governments of such countries to opt for low-carbon technologies is an important task. To this end, building local capacity in advanced electricity system planning that considers the grid integration of intermittent and partly more decentralized renewables (including flexibility options such as storage plants where needed) should be a priority. Also targeted concessional financing facilities that subsidize public-sector lending to RET projects may help MDBs to increase the share of low-carbon lending in the public sector branches.

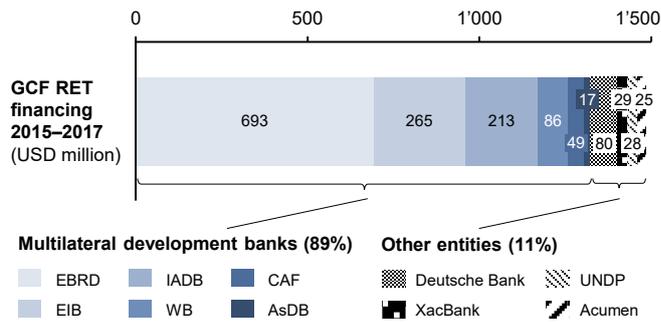


Figure 6: Financing approvals made by the Green Climate Fund (GCF) for renewable energy, arranged by accredited entity. This figure includes all GCF commitments approved during 2015–2017 for mitigation projects and cross-cutting projects that include renewable energy as a major component (excluding projects withdrawn as of May 2018). Commitments include loans, equity investments and grants. Numbers based on project portfolio data published by the GCF.

7. Conclusion

Most existing research on the financing activities of MDBs focuses on individual cases (e.g. one bank in one region). Our analysis complements this case study-based research by providing quantitative evidence on global patterns. The dataset we provide can be used in future research in multiple ways. For example, climate impact assessments could use the dataset to examine the compatibility of the current MDB portfolios with the Paris targets. Empirical studies analysing the effectiveness of renewable-energy support policies in developing countries could draw on the dataset to control for MDB financing. Of course, the data can also be used to identify interesting cases which should be analysed in depth through additional qualitative research. While here we focus on MDBs, our approach could be extended to other cross-border financial institutions, such as bilateral development banks/export-import banks and export credit agencies, some of which are increasingly active in power-generation financing as well. Prominent examples include the China Development Bank, the Export-Import Bank of China, and the Export-Import Bank of Korea^{24,38}. Another area for further research is the climate impact of MDB lending to local financial institutions, some of which engage in significant lending towards (high- or low-carbon) power generation. As the financing activities of MDBs are ever changing, the database should be regularly updated and validated, a task that seems suited for the OECD (extending the existing development aid database) or the International Renewable Energy Agency (IRENA).

Methods

Structure and scope of analysis

The article is based on a newly compiled database of MDB financing in power-generation technologies, which was constructed 'bottom up' by coding project-level information provided by the banks and other sources (existing datasets are not comprehensive enough for the analysis³⁹). Our database aims at being exhaustive for commitments to power generation projects and programmes while excluding investments in other activities and avoiding double counting (in cases where several banks are involved). The MDBs under study use different structures in their project databases, but each has a sector that includes electricity (and potentially other energy subsectors such as oil). Among commitments in the respective sectors, we only considered projects and programmes that provide capital for power-generation assets, as opposed to transmission and distribution (T&D) grid projects. In some cases, the power-generation projects included a T&D component (e.g. a new substation or grid connection line). If the T&D components exceeded approximately 10% of the investment sum, only the financing amounts related to power generation were considered (based on assumptions, if necessary). Pure 'technical-assistance' projects (i.e. investments that targeted the build-up of capabilities, feasibility studies, etc.) were excluded.

Data sources and coding

For almost all of the MDBs (except the CAF and the IsDB), we primarily drew upon project fact sheets, appraisal reports, environmental & social (E&S) reviews, project memos, board briefings and related documents, which were published by the banks following the approval of a project under their access-to-information policies. While basic information, such as project name, country and financing amount, is often published on the bank's website in a uniform way, further data needed to be extracted from documents with significant variations in structure and detail, which often represent different stages of the approval process (e.g. the initial project appraisal report assumed a higher financing volume than was later approved). Thus, the data was manually coded by seven research assistants. To account for missing data, secondary information was sourced via web searches of press reports (in English, Spanish and French) and company announcements. Each entry was independently checked by a second coder and, in case of disagreement, a senior researcher was involved. For the CAF, the Annual Reports include short summaries of all approvals made in the respective year. For the IsDB, an excel file of project approvals, including project name, country and financing amount, was provided.

To further ensure the quality of the dataset, consistency checks were conducted on projects that were co-financed by several MDBs (each of which published their own project documents), as well as on projects that drew on a concessional financing source which similarly published some information on its supported projects (e.g. the Climate Technology Fund).

Converting currencies and deflating

To convert local currencies to USD, we used yearly exchange rates from the International Monetary Fund's (IMF) International Financial Statistics (in cases where project appraisal reports provided both local currencies and USD, we directly used the provided USD figures). In a second step, nominal amounts were converted to real (2015) USD using the United States Consumer Price Index from the IMF's International Financial Statistics.

Estimation of capacity additions with MDB participation

Several steps were necessary towards estimating the percentages of power-generation capacity in certain regions/income groups with at least partial financing by one or several MDBs. First, the additional installed generation capacity (i.e. MW capacity added) was coded for each project. We considered incremental capacities only (thus, in the case of refurbishments without capacity increases, the value is zero). In many cases, installed generation capacity is not provided in project appraisal reports, but it is described in E&S reviews, company announcements (e.g. from the turbine manufacturer) or other sources. Assumptions were made where necessary (e.g. to calculate the unknown MW capacity from a given annual production volume in MWh). In some cases (11% of the total commitments), the information was unavailable; therefore, the sum of incremental capacity is a conservative estimate.

Second, it was important to prevent projects from being counted twice, in cases where several MDBs co-financed the same project. To this end, we recorded whether any other banks were listed as co-financiers for each project. We also compared all projects by country and technology to identify co-financiers that were not mentioned in the documents.

Third, the capacity additions in some regional projects (i.e. covering more than one country) were distributed evenly among all countries involved. This heuristic approach was chosen because detailed information on the distributions between countries was largely unavailable. In most cases, regional projects cover neighbouring countries within the same World Bank Group regions and income groups, so the distribution of capacity additions between countries does not affect the numbers shown.

Fourth, the total capacity additions financed by MDB commitments during 2005–2013 were summed up for each region and income group, as per the classification system of the World Bank Group. The numbers (GW) are shown in Figure 2.

Fifth, these capacity additions were compared with the total capacity additions per region/income group during 2007–2015. For the last years in the period under study, we assumed a lag of two years between MDB financial commitment and commissioning, because project preparations are typically well advanced at times of final MDB board discussion (for earlier years, this assumption has no effect, as later project realizations would still fall in the period under study). For RETs, total capacity additions per country during 2007–2015 were taken from IRENA capacity statistics. For fossil fuel-based technologies, total capacity additions were based on UN Energy Statistics (taking the difference in total installed capacity per country between 2006 and 2015, we assumed that no major decommissioning occurred, which is a reasonable assumption for the developing countries under study). Historically, the UN Energy Statistics showed some inconsistencies and are likely not fully accurate for all countries. In sum, we believe that the assumptions yield reasonable results for the regional aggregation level (as shown in figure 2).

Analysis of public- and private-sector activities

To distinguish between the public- and private-sector activities of the MDBs, the projects were coded as public, private or mixed/unspecified (i.e. a few projects that were set up as public–private partnerships or were missing data). Among the MDBs under study, the IFC and the MIGA only serve private-sector parties, and the AsDB and the EBRD have indicated in their project databases whether each project involved public- or private-sector lending. For the remaining banks, the coding was based on the client/recipient of the financial instrument (i.e. the borrower, in the case of loans). If the client was a government, the project was coded as public; if the client was a private company, the project was coded as private.

Complementary expert interviews

Finally, to help us understand the patterns that are visible in the data (explanatory sequential mixed-methods approach) and, in some cases, to clarify questions regarding the project data of specific banks, our analysis was complemented by expert interviews with senior MDB officials. All interviewees are experts that were recently involved in energy projects financed by both the public- and private-sector branches of the MDBs under study. As the interviews were held under the Chatham House Rule, no references can be made to the interviewees nor their affiliations; however, Supplementary Table 3 provides an overview of interviewees' job titles/roles. The interviewees were contacted using information available from public sources and through the networks of the authors. A total of 12 semi-structured interviews were conducted with officials from 6 different MDBs during 2016–2017. After each interview, key statements were identified by the two researchers and successively triangulated in the follow-up interviews, allowing us to determine the general themes reported in this paper. We continued to conduct interviews with the senior MDB officials until no additional thematic insights could be observed⁴⁰.

Data availability

The project database generated and analysed during the current study is available at <https://doi.org/10.3929/ethz-b-000289554>.

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