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Evidence from the African Water Sector**

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# **Do Demonstration Effects Catalyse Private Investment in Infrastructure? Evidence from the African Water Sector**

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## **Abstract**

*Demonstration effects play a perplexing role in the theories of change adopted by development banks and donors. Such effects are said to be important but cannot be measured or their mechanics fully explained. They are important because these organizations do not have enough funding to help developing countries fully cover the costs of achieving ambitious targets like the Sustainable Development Goals (SDGs), they must try to mobilize the balance of needed investment from the private sector. Some forms of direct mobilization are measurable, but demonstration effects are indirect and almost impossible to quantify. In theory, they occur when the success of a project supported by a development partner encourages replication by others using less concessional support. The importance of demonstration effects has grown as it has become clear that measurable types of mobilization account for far less private investment than is needed to achieve targets like the SDGs. Development partners repeatedly affirm this importance by routinely invoking these effects to justify subsidization of private investment projects. But proof of their existence—and importance—remains elusive. This paper uses a literature review and a case study of a notable public-private water sector investment project in Rwanda to evaluate the performance of demonstration effects in mobilizing private investment in infrastructure. Although the many development partners who supported this project confidently claimed that its demonstration effects were powerful and would prompt replication elsewhere, this investigation concludes that the project would most likely discourage replication by reasonably knowledgeable observers. Such conclusions suggest the need to better understand the nature of demonstration effects, why their existence is so widely taken for granted, as well as the wisdom of setting highly ambitious development targets like the SDGs which cannot be reached without significant levels of private investment.*

## INTRODUCTION

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The development community is facing a reckoning over the impending failure to achieve many of the Sustainable Development Goals (SDGs) that make up the ambitious 2015 United Nations SDG blueprint for addressing poverty in the developing world by 2030. It has been clear for some time that most of the targets will not be met, and when the final accounting is completed, one of the worst performing goals is likely to be SDG6, calling for universal access to safe water and sanitation by 2030.

An already acknowledged reason for poor SDG performance has been the failure of efforts to mobilize investment necessary to support the goals. The annual SDG investment gap was estimated at US\$2.5 trillion in 2014 (UNCTAD 2014). Estimates by the World Bank's Water and Sanitation Program published in 2016 indicated that in present value terms the share of the total needed to reach SDG6 by 2030 was over US\$1.7 trillion (Hutton and Varughese 2016). When the SDGs were agreed on in 2015, it was widely understood that even with maximum levels of official development assistance (ODA), developing countries would be unable to increase their water sector spending by the four or five times necessary to meet these goals. Private investment would be required to transform "Billions in ODA" to "Trillions in investments" needed to achieve these targets (World Bank et al. 2015, 1). "Blended finance" was embraced by the development community as "...the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets" (OECD 2017). In other words, private investment would need to be leveraged by public money.

However, after only a few years it became clear that not enough private investment was being generated to make a significant difference in terms of SDG achievement (Lee 2019; Saldinger 2020). This was particularly true of infrastructure investment in water and sanitation (Cortes 2016). This realization was echoed in a 2019 OECD report that acknowledged, "...blended finance has not gained sufficient traction for water-related investments" (OECD 2019, 3).

The failure of the SDG effort will trigger multiple studies and investigations to determine what went wrong. A variety of causes will be identified, but one of the most important, and perhaps the most difficult to understand, will be the apparent failure of "demonstration effects" to play a significant role in mobilizing private infrastructure investment by encouraging replication and scale-up of successful pilot projects.

The difficulty in understanding demonstration effects stems from the fact that they play a role in development economics like that of "dark matter" in astronomy and astrophysics. Dark matter accounts for various eccentric characteristics of the cosmos that defy routine explanation, like odd galaxy shapes or the unexpected speed of universe expansion. But dark matter does not emit or reflect light, making it undetectable through direct observation, so its presence must be inferred from other phenomena. Because dark matter fills a major gap in scientific knowledge in a way that makes intuitive sense, scientists have tentatively accepted its existence.

Like dark matter, there is almost no tangible evidence that demonstration effects exist, much less strongly motivate private investment in infrastructure. Such effects have been almost impossible to quantify or explain except on an anecdotal basis. But as with dark matter, the existence of demonstration effects is inferred by development partners like multilateral development banks (MDBs), development finance institutions (DFIs), and bilateral donors because such effects offer an attractive, logical solution to an important problem—how targets like the SDGs might be achieved given the fact that the combination of ODA and government budgets cannot by itself provide enough infrastructure investment to do so. In theory, if development partners use blended finance to support successful, innovative private investment projects, then the demonstration effects of these projects will trigger replication by others as well as broader market-like activity and, ultimately, private investments that need much less concessional support.

This paper explores the role of demonstration effects in mobilizing private investment in infrastructure, particularly in the water and sanitation sector. The importance of such effects for agendas like the SDGs is outlined, along with a review of the limited information currently available about the mechanics of demonstration effects. A final section of this paper is a case study of a recent water supply project in Rwanda, the US\$61 million Kigali Bulk Water PPP (public-private partnership). The project, which began operation in 2021, was supported by a broad collection of development partners using a variety of blended finance tools. Those partners claim that this project is a pioneering example of private investment in the water sector which will generate substantial demonstration effects capable of encouraging widespread replication. The lead financial arranger on the project has argued that projects like this are essential for SDG achievement: “If we are to achieve Sustainable Development Goal 6, universal access to safe drinking water, we need to see many more similar projects come to fruition across low-income countries in sub-Saharan Africa and Asia” (Cattaneo 2018).

The case study presented in the last section of this paper interrogates these claims and finds that in the case of the Kigali Bulk Water PPP the most prominent project characteristics visible to date are highly unlikely to generate positive demonstration effects that encourage project replication. The paper concludes that the purported role of demonstration effects in mobilizing private investment may have so much intuitive appeal for development partners that it is taken for granted rather than investigated using available evidence.

## **THE MEASUREMENT CHALLENGE**

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Demonstration effects represent a way in which development partners, like DFIs, MDBs, and donors, deal with a sobering reality of international development assistance: development partners do not have sufficient resources to fill what is a massive infrastructure funding gap in developing countries:

*The aim is therefore to leverage these resources, both by attracting multiples of private finance to co-invest, but even more importantly by demonstrating the feasibility and attractiveness of such investments to commercial actors. In particular, DFIs aim to provide an example of success, and so facilitate a step-change in private*

*investment in developing country infrastructure, where DFI participation is no longer required* (Spratt and Collins 2012, 4).

But there is little available quantitative evidence to suggest that demonstration effects facilitate private investment in this way, if they do indeed exist. An organized global effort is underway to collect information about what development professionals refer to as direct and indirect mobilization of private investment in emerging economies (Inderst 2021). Direct mobilisation involves the active crowding in of private co-financing for projects by structuring deals, offering risk mitigation tools, and serving as intermediaries to bring private financiers on-board specific projects. Indirect mobilization is less well defined, but generally refers to cases where a development partner provides some financing for a project alongside private financing—with no active or direct effort by the development partner that leads to private investment, so no causality is claimed. DFIs and MDBs submit information on direct mobilization to the OECD, following its methodologies for doing so. But “indirect mobilization” is not counted by OECD because evidence of causality is missing or uncertain (OECD 2018, 4).

A third and even less clearly defined form of mobilization includes demonstration effects. This is “private capital catalysation” in which private investment occurs indirectly because of actions by a development partner not directly associated with the particular private investment project (Cull et al. 2024). These actions include upstream MDB support for enabling environment reforms, capacity building, and various forms of technical assistance, which indirectly facilitate downstream private investment. Demonstration effects represent a particular type of catalysation involving support by a development partner for a project which, if successful, supposedly encourages replication by private investors in subsequent projects that will involve less (or not involve any) concessional funding by development partners. Since 2016, DFIs and MDBs have produced a collective report, separate from the one issued by OECD, which cites the importance of investment catalysation, sometimes with the use of case studies. But this report makes no effort to comprehensively collect and report reliable quantitative information on different types of catalysation such as demonstration effects (World Bank 2018a).

## **DEMONSTRATION EFFECTS AND THEORIES OF CHANGE**

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The inability to measure or even confirm the existence of demonstration effects has done little to moderate claims by development partners about the extent to which their work generates demonstration effects that lead to project replication. Such effects have long occupied a central position in many of the theories of change employed by these institutions:

- The World Bank’s internal evaluations of its work have long placed special value on projects that “...are early entrants, or have innovative structures, and therefore have strong demonstration effects” (World Bank 2003). The same kinds of judgments have been applied consistently in evaluations of project work done by the International Finance Corporation (IFC 2001) and the Multilateral Investment Guarantee Agency (MIGA 2006).

- When the Heads of Multilateral Development Banks (MDBs) convened in Washington in 2012 to establish best-practice principles for subsidy support to the private sector, they concluded that “demonstration effects” were a key mechanism for increasing the involvement of commercial parties in transactions, “...when early MDB support for transactions can promote replication or participation by the private sector” (EBRD 2012).
- In IFC’s 2012 description of its approach to “blended finance,” involving the provision of concessional subsidies supporting early market entrants, it was argued that market-wide development benefits could result as long as activities “...produce demonstration effects that are highly visible or otherwise able to be disseminated widely to others” (IFC 2012, 7).
- In its 2015 evaluation of the World Bank Group work on public-private partnerships (PPPs), the organization’s Independent Evaluation Group (IEG) argued that demonstration effects generated by Bank-supported projects went beyond project replication and influenced upstream reforms of the enabling environment:
 

*Bank Group-supported transactions often created a market for PPPs through their demonstration effects and, at times, helped shape the regulatory environment. Demonstration and replication effects of individual PPPs may be as important as the actual transaction* (World Bank 2015, 143).
- In its 2015 “Primer for Development Finance,” the OECD recommended using blended finance to “crowd in private funds” thereby overcoming investment obstacles with “Signaling effect and ‘stamp of approval’ by achieving ‘first-close’ or demonstrating viability” (OECD 2015, 13).
- In their now famous “billions to trillions” joint statement, leading MDBs pledged to “...play a catalytic role to unlock the potential of private finance” in their help to achieve the SDGs: “When MDBs invest in new areas or in high-risk environments there is an important demonstration effect that can lead to additional projects and new investors” (World Bank Group et al. 2015, 5).
- In its “Strategic Framework, 2018-2021,” the United Nations Capital Development Fund (UNCDF) described how its capital tools and technical assistance would be used in support of the SDGs: “UNCDF support to financial service providers and other parties seeks a demonstration impact that will help other service providers to replicate successful innovations” (UNCDF 2018a).
- In a 2018 joint report, the leading MDBs reaffirmed their commitment to mobilize private investment through “catalysation” efforts, and noted that this could be done “...on a much broader scale...” than through measurable forms of direct and indirect mobilisation: “What we measure as *private investment mobilization* is a subset of this, but it does not capture private investment beyond the boundary of the project, or which occurs after the project, or as a consequence of the project” (World Bank 2015, 15).

The importance of positive demonstration effects has come into focus over time as evidence has accumulated regarding the fact that more measurable forms of direct and indirect private capital mobilization are clearly falling far short of SDG objectives. UNCTAD estimated the annual SDG investment gap at US\$2.5 trillion in 2014, but the annual mobilization by direct and indirect means calculated by the Overseas Development Institute (ODI) five years later was still only US\$59.4 billion, with most of this investment in middle-income countries (Attridge and Engen 2019, 14). ODI concluded that the principal problem was an inability of blended finance to efficiently leverage private investment—ODI found that \$1 of public investment by MDBs and DFIs mobilised just \$0.37 of private finance in low-income countries (11). Unless the efficiency of blended finance could somehow be dramatically improved to increase the measurable forms of direct and indirect private capital mobilization, a significant contribution via the largely unmeasurable “catalysation” of such investment would be essential in making progress toward achievement of SDGs. Capacity building and enabling environment reforms would play roles in such catalysation, but the extent to which specific, desirable types of downstream investment can be targeted this way is limited. The shortest, most effective route to private investment scale-up tailored for targets like the SDGs would be for positive demonstration effects to encourage the replication of successful, innovative pilot projects selected for blended finance support by development partners.

There is probably no more compelling evidence of the widespread belief in the power of demonstration effects than the efforts by the development community to establish and maintain “project preparation facilities” (PPFs) over the last 25 years. PPFs comprise a large collection of programs and facilities mostly funded by bilateral donors and MDBs which prepare infrastructure projects so that they can successfully attract private investment. The best known PPFs are large, well-resourced facilities like the African Development Bank’s (AfDB’s) Africa50, the World Bank’s Global Infrastructure Facility (GIF), and the Private Infrastructure Development Group (PIDG), originally established by donors like the U.K.’s Department for International Development (DFID). The collection now includes hundreds of facilities worldwide, with diverse sector and country objectives, but mostly focused on private investment mobilization for different forms of infrastructure (Leigland 2024). A survey of PPFs focused on African infrastructure project preparation identified 67 entities in 2012 (CEPA 2012). A 2018 review found 136 PPFs offering preparation support for a broad range of infrastructure projects in Africa and Asia (SDIP et al. 2018). A global review of PPFs supporting clean energy infrastructure project preparation identified 150 facilities in 2018 (ODI 2018).

An enduring common PPF theme is their emphasis on “first movers,” “catalytic effects,” “pioneering projects,” and “demonstration effects.” These facilities are focused on the preparation of specific projects, rather than general technical assistance, capacity building, or advice on policies or regulations. But PPFs do not typically claim that the amount of private investment in the projects they prepare will by itself significantly close the infrastructure investment gap in developing countries. The theory of change articulated by most of these PPFs assumes that the indirect effects of this work, the demonstration effects of even a few near-commercial projects successfully reaching financial closure, will encourage project

replication and wider market development. So, donor or MDB support for a PPF represents an endorsement of the existence and power of project demonstration effects.

This theory of change is highlighted in the work of PIDG, established in the early 2000s. By 2019 PIDG claimed to have already committed US\$4 billion in funding, mostly from bilateral donors, for the preparation and catalytic financing of private infrastructure projects mostly in low-income countries (PIDG 2019a). PIDG has long argued that it is generating positive demonstration effects that result in market development, because the commercial successes of its pioneering projects incentivize the replication of private finance projects by others, ideally without PIDG support: “The need for infrastructure in these countries is huge and cannot be met by one organisation alone. Therefore our focus will remain on demonstrating to others the commercial viability of our projects” (PIDG 2012, 5). Replication by others is PIDG’s ultimate objective: “The biggest win for PIDG projects... arises if they result in subsequent investment by private sector investors, without the need for further PIDG support” (PIDG 2019b, 10).

## **RESEARCH ON DEMONSTRATION EFFECTS**

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Research on demonstration effects remains remarkably limited, especially considering how central the concept is to theories of change used to justify the activities of development partners and the hundreds of PPFs they support. The research literature provides little guidance about how demonstration effects work and which are most important. The literature does nothing to allay the OECD concerns about attributing causality to indirect private capital mobilization, much less catalysation. A recent review of literature on DFI mobilization of private investment has found that the descriptive and empirical evidence of mobilisation effects is mixed: “Recent evidence on DFI mobilisation effects is inconclusive, with limited applicability to infrastructure” (Mishra 2023, 4).

Studies of demonstration effects have been undertaken or sponsored by the development partners and PPFs directly involved in the preparation of demonstration projects. In 2018, PIDG commissioned a review to determine whether or not projects developed by two of its companies, the Emerging Africa Infrastructure Fund (EAIF) and GuarantCo, were generating positive demonstration effects (Lion’s Head 2018). The study examined a sample of three projects suggested by the PIDG companies, and found evidence of project replication in one case where original participants did a second project without support from the PIDG company involved in the demonstration project. PIDG’s website cited the study as “clear validation” of its positive effects on project replication. However, except for the one case, “demonstration effects” were limited to “increased familiarity” of potential private sector investors with the demonstration project structures and did not lead to actual project replication.

In 2020 the World Bank Group’s Independent Evaluation Group (IEG) tried to determine how effective the Bank, IFC, and MIGA had been in channelling private capital for development by reviewing a sample of these activities between 2007 and 2018. The study found that “The effectiveness of PCM [private capital mobilization] projects can be measured

by additionality and demonstration effects (new or increased commitments or replications of aspects of the project in terms of demonstrated success)” (World Bank 2020a, 31). But the study focused on direct forms of mobilization, rather than indirect catalysation. What IEF referred to as evidence of “demonstration effects” consisted mostly of repeat business for IFC and MIGA. In an appendix, the report briefly discussed a more traditional concept of demonstration effect – catalysation of private investment when the World Bank is not involved. But IEG referred to these as “catalytic effects” that could not be measured. The study found relatively few examples confirming either direct or indirect mobilization and drew vigorous, critical responses from the World Bank and IFC regarding data quality, methodology, underlying assumptions, and what the IFC described as a lack of “definitional precision” (xxviii).

Some studies of demonstration effects undertaken by independent consultants on behalf of development partners have produced even less compelling results. In 2011, IFC PPP Advisory commissioned a case study review and opinion survey seeking to identify the demonstration effects of some of its projects, selected for study via non-random sampling. The review examined 30 projects but could confirm strong positive demonstration effects in only five cases (Castalia 2011).

In 2012, PIDG sponsored a systematic review that examined DFI claims of development additionality in their work (Spratt and Collins 2012). The review noted the high frequency of DFI claims that they were generating demonstration effects contributing to project replication. But the review found little actual evidence of such effects in DFI reporting. The review concluded that project successes often resulted from DFI characteristics that could not be matched by private investors without DFI involvement, such as access to grant funding and quasi-concessional finance, high risk tolerances, as well as convening power capable of mitigating risks of political interference. The review also identified the frequent occurrence of what seemed to be negative demonstration effects that discouraged project replication as well as cases in which DFI involvement crowded private investors out of projects.

In 2019, the UK government commissioned an evaluation of the theory of change employed by its International Climate Fund (ICF). ICF attempted to mobilize private sector climate finance by relying on “demonstration effects” from “...visible, distinctive and catalytic investments that can be scaled up and replicated by private finance” (Compass 2019, 11). The evaluation found that four of the ten reviewed programs appeared to have catalyzed private investment in additional projects. But the new investments were all made or directly influenced by the investors in the demonstration projects: “We have not identified any examples of demonstration effects influencing the wider market of investors into investing because they saw others moving into a particular sector or country” (Compass 2019, 9).

Finally, the many references by development partners and their PPFs to demonstration effects generated by “first mover” or “pilot” projects seem inconsistent with the research on these concepts in economics and management science. Development partners and their PPFs routinely cite the importance of “first mover” projects in their arguments explaining how successful, one-off transactions encourage replication, apparently without the need for supporting capacity building or policy advice. The researchers who originated the concept of

“first mover advantage” in 1988 documented its misinterpretation and misuse over the following decade (Lieberman and Montgomery 1998). Many later studies have continued this critical assessment of first mover advantages by highlighting the frequency of first mover “disadvantages” (Suarez and Lanzola 2005).

In the literature on economics and management science, “first mover advantage” is not a term typically used to describe pioneering investment projects prepared with support from development partners, which encourage project replication without such support. “First mover advantage” most often refers to commercial market situations in which companies offer new products, exploit new manufacturing processes, or succeed in making existing products attractive to a new class of customers. These first movers can be successful and can have wider market impacts, including replication of products or enterprises, but only if other market characteristics are in place: “Pioneer firms will only succeed in an economic environment where multiple firms are succeeding, so creating value chains and markets is essential for their growth” (Collier et al. 2019, 4).

## **AFRICA’S WATER SECTOR INVESTMENT CHALLENGE**

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### **Investment Needs**

Meeting the water sector challenges in Sub-Saharan Africa is of course not just about mobilizing investment. Sector policies and operational procedures need to be upgraded across the continent as is the case in most other developing country regions. But lack of investment is still a formidable problem in Africa. In the first major effort to comprehensively quantify infrastructure investment needs in Sub-Saharan Africa (SSA), the World Bank’s 2009 *Africa Infrastructure Country Diagnostic (AICD)* calculated that actual capital investment in SSA’s water sector was only about US\$4.7 billion per year. This was less than a third of the US\$14.9 billion that AICD estimated was needed to meet the MDG targets for water and sanitation by 2015. Even with institutional reforms and the elimination of sector inefficiencies, SSA’s water sector would still have faced a massive investment gap of US\$9.3 billion per year (1.5 percent of total African GDP), with the gap for fragile low-income countries at over 7 percent of GDP (Foster and Briceno-Garmendia 2010). That shortfall was an intractable challenge at the time for the MDGs and has increased since then to present an even bigger challenge for the SDGs.

This investment challenge has long made the African water sector a prime target of development partner efforts to generate demonstration effects from successful private investment projects that lead to replication and scale-up. But the process of identifying, preparing, and operating suitable projects has been a struggle, not only to get projects to financial close on at least a semi-commercial basis, but also to keep water projects functioning long enough to encourage replication. Several well-known projects illustrate this challenge:

## **South Africa's Water Concessions**

In 1999, two privately financed, long-term water concession reached financial closure in South Africa with the help of one of the earliest donor-funded infrastructure PPFs on the continent (the USAID-supported Municipal Infrastructure Investment Unit). The two projects continue operating today, now the oldest long-term African water concessions to do so. But whatever demonstration effects may have been generated by the projects seem to have been largely negative. Project preparation took far longer and was more complicated and expensive than expected (Kotze et al. 2000). Preparation led to bitter arguments with organized labour and anti-privatization advocates in South Africa who accused the municipal officials involved of mismanagement and corruption. The government's sector regulatory framework created risks for private investors that severely limited their involvement in the projects (Leigland 2003). Both projects experienced difficult renegotiations soon after the beginning of operations. The unmistakable message to other local governments in the country was to avoid such projects, and no project of this type or scale has been attempted since in the country's urban water sector.

## **The Dar es Salaam Water Lease**

This ten-year lease, which began operation in Tanzania with much fanfare in 2003, was another notable African water sector PPP that reached closure but clearly has not generated positive demonstration effects. The project involved a competitively tendered contract with a private UK-based company that was expected to operate and maintain the Dar es Salaam water utility while investing a relatively small amount of capital. The project was celebrated as a model for other countries because of its modest investment ambitions and reduced risks for the private partner. The government was incentivized to enter into the contract by a US\$165 million water sector improvement program funded by the World Bank, AfDB, and the European Investment Bank. But the project collapsed less than two years after operations began because of government dissatisfaction with project performance. News stories of private water managers being deported in handcuffs, and the lengthy, acrimonious legal disputes that followed, generated a negativity around water PPPs that lingered for years in Southern Africa (Leigland 2020).

## **The Ghana Management Contract**

In Ghana, a five-year management contract involving operations and maintenance of water services in Accra was signed in 2005 by the government and a joint venture involving the Dutch government-owned water company, Vitens, and the South African parastatal water company, Rand Water. The "public" nature of the operator partnership was considered a pioneering innovation that would dispel long-standing public concerns in Ghana about "water privatization." The contract was incentivized by a US\$120 million World Bank capital investment program offered with the understanding that the government would competitively tender a long-term PPP contract sometime before the expiry of the management contract (Ghana Management Contract 2005). But when the contract expired in June 2011, the service was brought back fully under government control. The government claimed that the private company had "...failed to bring about the expected positive improvement in urban water supply" (GWCL 2013). Government and public opinion had turned against the contract because of water shortages and tariff increases (arguably beyond the contractor's control),

along with staff complaints about “private sector” management practices, and continued targeting by anti-privatisation protestors. Again, if demonstration effects were generated by the project they would have been almost exclusively negative.

### **The Kigali Bulk Water PPP**

Hopes for positive demonstration effects from a private investment project in Africa’s water sector were renewed once again by the Kigali Bulk Water PPP, which reached financial closure in 2017 and became operational in 2021. This is a 27-year, US\$61 million contract with the Metito Group of Dubai, structured on a build, operate, and transfer (BOT) basis. The contract requires the concessionaire to design, construct, finance, and operate water production and treatment facilities that will extract groundwater from a local river bank, treat the water to required quality standards, and deliver it to the government’s national water utility for distribution to end-users. The project was expected to provide 40 million litres of potable water per day for the city of Kigali and Bugesera, a district in the Eastern Province of Rwanda, thereby helping the government meet its policy targets for expanded access to water.

The Water and Sanitation Corporation (WASAC), the government-owned utility responsible for retail water distribution to urban household and business customers, is the sole purchaser (or “off-taker” in industry parlance) of Metito’s treated water. WASAC contracted with Metito to supply water on a “take or pay” basis, meaning that the agreed amount of water must be paid for whether or not needed or used. The Rwandan government provided a sovereign guarantee to secure WASAC’s financial commitments pursuant to this PPP arrangement. That sovereign guarantee was then backed by a third-party guarantee from MIGA.

The project was a collaborative, blended finance effort involving a variety of development partners. These actors included AfDB, the World Bank’s Public-Private Infrastructure Advisory Facility (PPIAF), MIGA, IFC’s PPP Advisory, the Emerging Africa Infrastructure Fund (EAIF, a PIDG facility), and various bilateral donors who made grant funding available to support the project. These participants have been clear about their expectations that major development impacts of the project would include strong, positive demonstration effects:

- AfDB (financier): a principal “development outcome” of the project is its “strong demonstration effect... therefore contributing to private sector development” (AfDB 2015).
- MIGA (guarantee provider): “This is the first public-private partnership in the water sector in Rwanda and one of the few bulk water public-private partnerships in sub-Saharan Africa. As such, it will have an important demonstration effect” (MIGA 2018).
- The executive director of EAIF (the lead finance arranger): the project was an example of EAIF’s efforts to “...play a trailblazing, risk-reducing role in the sector, demonstrating what is possible and encouraging the private sector to invest in similar schemes...” (Cattaneo 2018).

- Metito (the concessionaire): “It is expected that this landmark project will pave the way for other similar capital-intensive projects in Africa” (Metito 2018).
- In 2023, the Kigali Bulk Water PPP became the first asset owned by a new company, Africa Water Infrastructure Development (AWID), formed by Metito and British International Investment (BII). BII’s Managing Director claimed that, using the “viable commercial model” pioneered by Metito for Kigali, “AWID will demonstrate to other investors, governments and operators that private investment can deliver operationally efficient and high-impact water infrastructure projects at scale...” (Metito Utilities 2023).

A wide range of authoritative organizations have also recognized the potential of the project to generate positive demonstration effects:

- The United Nations Development Programme’s *Africa Green Business and Financing Initiative Report 2024*, cited the Kigali Bulk Water PPP as one of two notable “large transformational infrastructure projects” “...which demonstrate innovative business models with high potential for replication elsewhere” (UNDP 2024, xii).
- Convergence Finance, which monitors the use of blended finance to increase private investment in developing countries, cited the Kigali Bulk Water PPP as an example of EAIF “Demonstrating the investability of the SDGs: Beyond the direct and indirect impact of EAIF’s investments... there have been positive demonstration effects for private infrastructure in sub-Saharan Africa” (Convergence 2018, 10).
- The United Nations Capital Development Fund (UNCDF) used the Kigali Bulk Water PPP as one of five project examples showing that “...blended finance in LDCs [least developed countries] can create demonstration effects that support commercial replication over time, inform government-led policy improvements and potentially support the development of local markets” (UNCDF 2018b, 1).

The project has been celebrated for its ground-breaking nature via multiple “project of the year awards” spanning the period from financial close (2017) to commercial operation (2021): e.g., Global Water Awards 2018; Africa Investor Awards 2018; *Infrastructure Journal* Global Awards 2018; Partnership Awards 2018; Principles for Responsible Investment Awards 2019; International Desalination Association Awards 2022.

The project has also been widely praised in the news media and on company websites for its pioneering, “first mover” nature, particularly because it has frequently been characterized as “Africa’s first water PPP” or the “first PPP of its kind” (e.g., Rwahigi 2015; CCE NEWS 2017; WaterWorld 2017; InfraPPP 2017; African Review of Business and Technology 2017; Thomson Reuters 2018; Open Africa 2019; Business Daily 2023; Afri Fund Capital 2025).

## **DEMONSTRATION EFFECTS OF THE KIGALI BULK WATER PPP**

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After successfully reaching financial closure in 2017 and beginning commercial operations in 2021, what can be said about demonstration effects generated by the Kigali Bulk Water PPP?

Have the many expectations regarding the project’s positive demonstration value, cited above, been fulfilled? The literature on demonstration effects offers very little guidance on how, when, or why these effects exist or have impact. Therefore, to answer these questions the case study that follows is based on several key assumptions about demonstration effects, including the following:

1. Demonstration effects sometimes exist, in the sense of project characteristics that motivate behavior by others not involved in the project. Effects might be positive, in that they encourage project replication, or negative, in that they discourage replication. The principal interest in this study is on the way in which reference to demonstration effects is most often used to justify subsidization of private investment in infrastructure – their ability to inspire replication that begins to achieve scale-up with less concessional funding.
2. The demonstration effects of PPP projects are likely to be most powerful after a project has begun commercial operation. Reaching financial closure is of course noteworthy, but operation signals that the project has successfully navigated the challenges of preparation, financing, construction, permitting, etc., and has reached a stage where risks to project viability have been greatly reduced. How long demonstration effects remain potent depends on the perceived performance of the project over time.
3. Demonstration effects can be important in motivating the behavior of both public and private actors, but the most important audience for PPP demonstration effects consists of public sector actors, primarily governments and government-owned enterprises (although multilateral development banks and bilateral donors can also be powerful “public” actors in scaling up the use of PPPs). This is because public sector actors ultimately determine which projects go forward as PPPs. By 2018, according to the World Bank Group’s Private Participation in Infrastructure (PPI) database, 95 percent of PPPs reaching financial closure were projects competitively tendered by public sector actors (World Bank 2025). This suggests that demonstration effects have the most powerful impacts in terms of replication when they motivate public sector actors to propose projects for procurement.
4. Demonstration effects are likely to resonate with public sector actors when they directly or indirectly address the project characteristics that are most important to these actors. Most governments have clearly identified the project characteristics that they consider most important when deciding to approve a project for PPP procurement. The World Bank has surveyed developed and developing countries several times to determine which of these characteristics are considered important by the largest percentage of governments. Table 1, based on the 2020 survey of 140 countries (consisting of 30 high-income countries and 110 low- and medium-income countries), lists the PPP-specific project characteristics considered important by at least half of the respondents.<sup>1</sup>

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<sup>1</sup> Large percentages of these countries also require environmental and social impact assessments because of broad national environmental laws that require such reviews for any large infrastructure project regardless of the delivery mechanism.

**Table 1. The Most Widely Used Government Criteria For PPP Project Evaluation**

(N=140)

<u>No.</u>	<u>Criteria</u>	<u>Percentage</u>
1)	Fiscal Affordability	81%
2)	Benefits vs. Costs	78%
3)	Value for Money	76%
4)	Risk Mitigation/Sharing	74%
5)	Financial Viability/Bankability	71%

Source: World Bank 2020

5. The project characteristics that generate meaningful demonstration effects must be discernible from publicly available information, or information accessible with modest amounts of investigation, which can be interpreted by reasonably knowledgeable observers. (All of the information used in the case study below comes from the publicly available sources cited in the previous section.)

In the sections that follow, project characteristics observable two to three years after the commercial operation date of the project have been grouped for examination into the five categories listed in Table 1. Each of these characteristics is viewed from the perspective of both prospective public sector observers as well as private sector observers.

### **1. Fiscal Affordability**

Of strong interest to public and private observers is whatever can be immediately understood about a project’s costs. Public utilities, regulators, government DFIs, and other governmental entities are interested in the long-term fiscal and budgetary impacts of the project in question, and whether or not total costs are affordable for the government. Key cost categories are how much public money is required to prepare such a project, what the resulting infrastructure services will cost end-users (the price of services), and whether or not operating subsidies will be required. Often, the public sector defines affordability in terms of whether or not a project can ultimately “pay for itself,” in the sense that government revenues from project operations should at least cover government costs. Failing full cost coverage, many governments want to see costs accurately identified along with specific sources of funding that can and will be used to cover the costs. (All costs ultimately must be measured against the size of project benefits generated for government and end-users – the subject of the next section.)

Potential private partners in projects of this kind—private operators and investors—have concerns similar to those of public partners, but to different degrees and from different perspectives. Preparation costs are important for private partners because covering such costs normally represents a significant investment of time and money, and involves the riskiest form of private investment in a project because preparation costs are often not fully recoverable from operations. And if a project does not reach financial closure for whatever reason, the private partner’s incurred preparation costs typically cannot be recovered. The time needed for preparation is important as well. Long preparation periods may be needed projects that are fragile, require complicated financial engineering, or supporting government reforms.

The private partner is also concerned about the cost of services provided by the project. The price paid by end-users must be high enough to cover operating costs plus profits, but not so high that end-users or the government refuse to pay. In one sense, private partners do not care how their revenue expectations are met—if not from system revenues, then from government subsidy. But a private partner faces significant risks if it must heavily and consistently depend on government subsidies for payment of its service invoices. The need for subsidies, especially unanticipated needs, inevitably raises questions from politicians and the general public regarding the rationale for a project. Newly elected governmental administrations have famously withheld payments for projects deemed too expensive, insisted on public investigations of such costs, or even demanded contract renegotiation to increase the affordability of services provided (Leigland 2020).

Preparation Costs. As with any project of this nature, the full preparation costs of the Kigali Bulk Water PPP have not been publicized, even by the development partners involved. But many of the key features of preparation could be easily pieced together by interested public and private observers. Project preparation was led by IFC PPP Advisory from 2010 until commercial closure was reached in 2015, when the government signed commercial agreements with the preferred bidder. Financial closure, involving lending agreements, was achieved two years later, with agreements signed by the preferred private bidder and its lenders, AfDB and EAIF.

IFC's preparation costs are normally covered by an upfront government payment, plus monthly retainers paid by government, and a success fee paid by the preferred bidder. But IFC Advisory also has access to donor grant funding from IFC-managed trust funds, as well as from other trust funds established by donors and managed by the World Bank Group and others. For example, by 2015, PPIAF (a multi-donor trust fund managed by the World Bank) had already publicized the four years of technical assistance it had channelled through IFC Advisory to help create a stand-alone national water utility in Rwanda, WASAC, which could serve as the off-taker of the water supplied by the private investment project (PPIAF 2015).

As the project was being prepared, the high costs of project preparation in regions like Africa were catching the attention of market participants. In a 2015 staff report to AfDB's governing board the total cost of preparing first-time infrastructure projects in new sectors was estimated to be 10-15 percent of total project cost, not including costs for lenders or bidders (AfDB 2013). Various reports and studies available at the time helped substantiate the AfDB claim that project preparation costs in developing countries were very high (Bhattacharya et al. 2012; Lin and Doemeland 2012; De Schepper et al. 2015). If AfDB's estimate was correct, preparation costs for the Kigali Bulk Water PPP would have been about US\$8 million, assuming the project's original estimated total cost of US\$75 million. Presumably, PPIAF's technical assistance costs in support of WASAC would be in addition to that amount.

Observers with experience developing PPP project in Africa would also have been aware that in most African countries, including Rwanda after 2018, project preparation costs were substantially increasing due to tightening of the requirements for government approval of PPPs. The Kigali project reached commercial closure in 2015, after a cursory government review focused on the price of treated water. The government established a PPP legal-

regulatory framework in 2016, and defined detailed analytical requirements for government approval of PPPs two years later. After 2018, Rwandan government approval of a project like Kigali Bulk Water would have required a host of analytical studies most of which were not prepared much less reviewed in 2015: a formal needs analysis, a technical solutions options analysis, engineering due diligence, an environmental impact analysis, an economic and social cost benefit analysis, an analysis using a financial model to confirm long-term commercial viability, a risk identification and allocation analysis, a project structure assessment, and a value-for-money assessment involving preparation of a public sector comparator (PSC)<sup>2</sup> (Republic of Rwanda 2018).

The significant cost and time needed to prepare the Kigali Bulk Water PPP, even before such strict analytical requirements were in place, was also noteworthy because the Rwandan government was earning a reputation for efficiency and effectiveness at the time. In 2017, Rwanda, a low-income country, ranked second among all Sub-Saharan Africa countries in the annual “Ease of Doing Business” survey (World Bank 2017). Two years later, Rwanda had moved up 27 places in the rankings, passing developed countries like Switzerland, Japan, Spain, and France (World bank 2019). So, for public and private observers of the Kigali project, the need for significant resources used in the preparation process would likely signal more about challenges associated with the project structure than about government competence or commitment. A related signal would be that preparation costs would likely be much higher for similar projects in most other low-income countries.

Cost of Services. The cost of services provided by the Kigali Bulk Water PPP was a major concern of Rwandan officials throughout the preparation process. As the project was reaching financial close in 2017, the Rwanda Utilities Regulatory Authority (RURA) abruptly insisted on a bulk water price reduction of 30 percent to achieve service affordability. The parties quickly restructured the project to reduce costs, by shifting responsibility for financing and constructing some of the assets from the private partner to WASAC. The price of the project’s bulk water reduced by 30 percent as the total project cost dropped to US\$61 million from the US\$75 million that had been under negotiation (UNCDF 2018b). AfDB facilitated the arrangement by offering a US\$14 million sovereign-backed concessional loan to the government to finance the shifted assets, which included transmission pipes and storage reservoirs—all referred to as “forwarding infrastructure” (MIGA 2015).

The restructuring was successful and the cost of bulk water was lowered significantly, but soon after the project became operational in 2021, Rwandan officials realized that cost reduction had not gone far enough. The water produced by the operational project was not only still unaffordable for WASAC, but it also represented a threat to the sustainability of the utility. In the 2021 report by the Rwandan Auditor General, issued just four months after the start of project operations, the cost to WASAC of the water produced by the new treatment plant was reported to be three times the average cost of water from the 25 other plants owned and operated by WASAC (Republic of Rwanda 2021). This cost consumed 44 percent of WASAC’s total monthly sales revenue, meaning that the utility could not pay the monthly

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<sup>2</sup> A PSC is a theoretical, risk-adjusted estimate of the total life-time cost of a project, if it were financed, built, and operated using traditional public investment

project costs without government subsidy support. The Auditor General noted that the project’s “take-or-pay” provisions meant that the situation would become much worse over time—the utility was obligated to purchase all of the originally agreed amounts of water produced by the plant whether needed or used, and the price would automatically increase annually with inflation.

Subsequent audit reports in 2022 and 2023 continued to publicize the affordability problems caused by the project. By 2022, the price of the project’s water had increased above the maximum price at which WASAC could sell to its customers. The take-or-pay requirement forced WASAC to maximize its use of the water produced by the project, meaning that it had to cut back on water production at two other, lower-cost, facilities (Republic of Rwanda 2023).

WASAC’s difficulties in managing the distribution of water received from all of its plants further exacerbated its affordability problems. The Auditor General continued to report on the steadily growing percentage of the utility’s non-revenue water (NRW)—water produced for consumption but for which revenue was not received. In the Auditor’s 2020 report, NRW stood at 41 percent, but increased to 45 percent by June 2022. This represented approximately US\$9 million in foregone revenue in 2022 alone. One of the Auditor’s concerns was that these high levels of NRW were further eroding the utility’s ability to pay for the water provided by the Kigali Bulk Water PPP. The Auditor warned that, given the combination of cost increases associated with the Kigali project and high levels of NRW, “...the financial sustainability of WASAC Ltd is at stake...” (Republic of Rwanda 2023, 38).

## **2. Socioeconomic Benefits vs. Costs**

Efforts by public and private observers of the Kigali Bulk Water PPP to weigh project benefits against likely project costs were difficult before the project had much of an operational track record. Private sector observers are of course interested in the profitability and sustainability of such a project. Public sector observers are interested in end-user benefits, largely in the form of increased or enhanced, affordable services. Until the size and nature of those kinds of benefits become clear after a significant period of operation, outside observers would begin their assessment of the project by trying to understand what water sector problems the project was meant to solve, and the likely effectiveness of the project in solving those problems. Does the structure in this case address a sector priority that was important in Rwanda? Replication of the project will also depend on whether or not the problem it solves is common to other countries.

The Kigali Bulk Water PPP was structured as a “build-operate-transfer” (BOT) project, meaning that it focused on the financing, construction, and management of new (or “greenfield”) assets needed for the extraction, treatment, and transmission of water that is sold to a government distribution utility on a wholesale basis. The greenfield BOT or BOO (build-own-operate) structure has proved its relevance and sustainability in the power and transport sectors in the form of Independent Power Producer (IPP) projects and toll roads. The greenfield structure allows a private partner to build and manage new assets, therefore avoiding unexpected rehabilitation needs for existing, poorly maintained government assets. The new systems can be managed without direct involvement by government or utility

personnel, and annual or semi annual payments for the wholesale services can be made by government or a government-owned utility rather than by thousands of individual end-users who are sometimes unwilling or unable to make monthly payments. The government payments also facilitate the use of sovereign guarantees to insure payment. Greenfield BOT and BOO projects account for an overwhelming majority of transactions in these sectors and combined, these projects make up over 84 percent of all infrastructure PPP projects in the developing world (World Bank 2025).

However, PPPs in the water sector lag far behind power and transport in terms of numbers and investment. The reason for this is that the greenfield BOT project structure is far less applicable generally in the water sectors of developing countries than it is in power or transport sectors because of the typical size of needed investment. The most pressing need for investment in the power sector usually is electricity generation—storage of electricity is expensive, so it must be generated almost constantly, using expensive and complex assets requiring large investment. Electricity transmission is less of a problem—with minor enhancements, existing transmission lines usually can transport power from multiple generators, facilitating the possibility of competing suppliers.

In contrast to the power sector, water providers usually cannot share transmission pipes, and these assets are typically too expensive to construct for each new water provider. Plus, in most urban jurisdictions, even in regions like SSA, the main available sources of water are already being exploited. There are relatively few investment opportunities related to new water sources or new piped networks. There are sometimes urgent capital investment needs in these networks, but the investments involve asset rehabilitation and extension more than construction of new networks. Sometimes, water sectors need major new asset investments for activities like desalination or water re-use. But many if not most sector investments are typically too small to warrant the resource expenditures required for private participation on a project finance, or PPP, basis.

All of this means that large-scale capital investment from private sources is less essential in the water sectors of developing countries than in their power or transport sectors. This fact is reflected by figures from the World Bank’s PPI Project Database (World Bank 2025) which show that in Sub-Saharan Africa from 1995 to 2023, the total private investment in electricity was over 10 times greater than in water and sanitation. Because the water sector typically needs asset rehabilitation and extension, along with better operations and maintenance, traditional public investment plays a much larger role in the sector than in power or transport where private investment is often essential. If a potential water project is large enough to justify the cost and complexity of a PPP arrangement, development partners usually recommend “brownfield” solutions like concessions, leases, and management contracts, which focus primarily on rehabilitation, extension, or simply better commercial management of existing assets and service systems.

For these reasons, there have been relatively few PPPs in the SSA water sector compared with IPPs, for example. But the Kigali project was far from being what *Project Finance International (PFI) Yearbook 2018* called “Africa’s First Water PPP” (Thomson Reuters 2018). The World Bank’s PPI Project Database records 31 PPPs reaching financial closure in

the SSA water sector between 1990 and 2017 when the Kigali project reached financial closure (World Bank 2025). Most of those projects were “brownfield” PPPs, but three were greenfield projects using BOT models similar to Kigali’s, and several of these projects involved larger amounts of private investment than Kigali’s. The scarcity of greenfield PPPs in the African water sector was not because no one knew how to structure such projects before Kigali Bulk Water demonstrated the approach. The scarcity has been due primarily to factors like the small average size of investment needs, low likelihood of commercial viability, and lack of sector relevance.

### **3. Value for Money (VFM)**

“Comparative assessment” or “value for money” (VfM) analysis are terms that refer to the determination of the best possible solution to an existing problem, given the resources available, emphasizing not just cost but also quality, effectiveness, and long-term benefits. Public and private observers are typically interested in the reasons why a project has been implemented using private investment versus public investment, or why a particular type of private investment model was used. Are the reasons that applied in the case of the Kigali project likely to be compelling for government regulators as well as private investors considering similar projects in the water sectors of other countries?

As noted above, Rwanda did not start requiring the most rigorous form of value-for-money analysis, using a public sector comparator (PSC), until 2018—well after the government approved the Kigali Bulk Water PPP. In any case, public and private stakeholders observing the project from a distance would have been mostly uninterested in complicated PSC analyses, even if they had access to the results. However, astute observers would nevertheless have had some basic value-for-money questions about the Kigali project:

First, it would most likely occur to some observers that WASAC or the government might have been able to source concessional or near-concessional funding for the project from development partners without the necessity of spending seven years preparing an expensive and complicated PPP contract. The rapidly improving efficiency and effectiveness of the Rwandan government, reflected by its precipitous climb up the World Bank’s Doing Business rankings, made it a highly attractive beneficiary of donor and MDB support. That fact was evident in the quick agreement by all of the project stakeholders on a plan to shift responsibility for essential project forwarding assets to WASAC, as well as AfDB’s rapid approval of the US\$14 million concessional loan to the government to finance the construction of those assets. If new asset construction was the priority, the government or WASAC seems to have been able to do that with enough funding, and development partners appeared to be willing to supply such funding on a concessional basis.

Second, criticisms of the project by the Rwandan Auditor General at least indirectly raise questions about the type of PPP used for this project. WASAC needed new sources of bulk water to serve Kigali customers, but arguably needed help more urgently with operating and maintaining its existing service system. According to the 2023 audit report, delayed upgrades meant that nearly half of WASAC’s water treatment plants were operating well below maximum capacity, the waiting list of new customers requesting connections was in the thousands, over 120,000 broken or missing water meters meant that these customers were not

being accurately charged for their water use, and WASAC's failure to bring NRW under control meant that it continued to lose about as much water as WASAC was required to purchase from the new PPP project (Republic of Rwanda 2023).

All of this suggests that WASAC was a good candidate for private participation that combined new water sources with expert assistance in operations and maintenance, perhaps via a concession, lease, or management contract, rather than the narrower kind of build-operate-transfer arrangement that focused exclusively on new assets needed for the wholesale supply of water.

Third, somewhat more knowledgeable observers would have been aware that Rwanda's development partners had long recommended precisely this kind of broad private participation in Rwanda's water utility management. From the mid-1980s until 2015, the World Bank and others had urged the Rwandan government to consider a wide range of brownfield PPP options like concessions, leases, and management contracts to address growing problems with utility operations. A 2005 report by the World Bank on the state of Rwanda's water sector documented what was already a 20-year history of such recommendations and suggested new efforts to design a management contract, followed by a concession (World Bank 2005). But after 2005, government efforts to implement these kinds of projects continued to fail because of an inability to reach agreement with prospective private partners on performance targets and risk sharing—just as earlier efforts had failed beginning in the 1980s.

In 2010, IFC suggested a fundamentally different approach, involving much less private sector risk and—arguably—much less public sector benefit. This was a long-term BOT contract focused exclusively on providing a new, wholesale supply of water. IFC accessed PPIAF funding to successfully corporatize the water utility so it could act as the contract counter-party, but there was no on-going private involvement in the utility. The operational problems identified in 2005, such as high levels of NRW, were left unaddressed by the “greenfield” BOT contract and continued to grow, to the point where according to the Auditor General they threatened the sustainability of the utility.

The Kigali project may have successfully exploited the one type of large PPP project that could attract private participation in Rwanda's water sector, given the long and difficult history of efforts to implement conventional brownfield PPP models. If the principal objective of the government was to facilitate private investment in a new supply of water, then the contract was certainly a success. It is less clear if that contract structure was the most cost-effective way of solving that problem, or even if wholesale water supply was the principal sector problem requiring a private sector solution.

#### **4. Risk Sharing**

Public and private observers of the Kigali Bulk Water PPP would also be interested in the size and types of project risks and the nature of risk sharing achieved by the project's contractual arrangements. Governments want to see performance and financial risks made the responsibility of private partners to ensure that the public sector does not bear an unfair financial burden—especially if the project goes over budget or eventually collapses.

Appropriate levels of risk for the private partner incentivizes them to innovate, reduce costs, and maintain high performance standards. Private parties are of course more willing to engage in public investment projects when they are not exposed to excessive or unmanageable risks. Both public and private partners are usually well aware that balanced risk sharing improves the project's creditworthiness and bankability in the eyes of potential lenders and investors.

In trying to evaluate project risk sharing from a distance, a principal concern is whether or not one party is burdened with too much risk that they cannot mitigate, throwing the long-term viability of the project into question. What would be obvious to at least some knowledgeable observers regarding the PPP project structure recommended for the Kigali project by IFC was that it involved a balance of project risks that strongly favored the private partner. Some observers might also recognize that this balance represented an abrupt change in the risk-sharing arrangements previously proposed by the country's development partners.

As noted above, the earlier recommendations focused on asset maintenance and rehabilitation, and as a result the kind of private participation needed was a "brownfield" PPP contract structure. In a conventional brownfield water concession, like the water concessions signed in Gabon and South Africa in the late 1990s or the water management contracts signed in Ghana and South Africa in the 2000s, the private partner is usually responsible for rehabilitating, extending, operating, and maintaining a water system's assets. Because the private partner typically must derive income from end-user tariff revenues, they have an incentive to provide customers with acceptable services but also face risks to cash flows if customers are unwilling or unable to pay water tariffs.

In industrialised economies, brownfield projects are often attractive to potential private partners because the risks associated with the need to set up and operate the services in a commercial fashion are mitigated because the system already exists and is operating. So, risks associated with construction, licensing, business development, and to some extent operations, no longer exist, have already been mitigated, or are at least clearly visible. In developing countries however, government-owned utility assets are often old, inadequately maintained, and poorly monitored. Because water assets like pipe networks are usually underground, they may be difficult to evaluate or even locate. The PPP experience since the early 1990s has taught private investors that such assets are usually in much worse condition than that reported by government utilities, and inevitably more costly to rehabilitate than estimated by these utilities. In developing countries, this experience has eroded the conventional belief that brownfield PPPs are less risky than greenfield ones (Leigland 2018).

In these same developing country environments, "greenfield" BOT or BOO structures tend to be much less risky because they emphasise construction and operation of new assets by the private partner, so quality of the assets is far better understood along with maintenance and rehabilitation needs. Over time, IPP sponsors have learned to further minimize risk exposure by securing the contracts with long-term, take-or-pay power purchase agreements denominated in US Dollars, and insisting on agreements backed by sovereign guarantees (and often additional third-party guarantees backing the sovereign commitments).

The ability of the Kigali Bulk Water PPP to attract private participation was largely the result of a project structure that dramatically reduced private partner risks by mirroring a greenfield BOT structure like that used for an IPP. The contract includes the same kinds of take-or-pay agreements and guarantees as a typical IPP. Risks to cash flows and profitability are minimized with tariff payments in hard currency made annually by WASAC rather than monthly by thousands of household and business customers.

The project emulates the other major, investor-friendly feature of a typical electricity generation IPP. Unlike traditional brownfield water concessions, the Kigali project avoids directly addressing issues with the ongoing management of the national water utility, WASAC. The private partner's role is limited to the provision of bulk water to WASAC, which remains exclusively responsible for utility operations, including the delivery of water to end-users, billing, collections, NRW reduction, etc. Over the lifetime of the concession, the Rwandan government and WASAC will need to deal effectively with these sector issues and operational problems if the additional bulk water provided by the project is to be used cost-effectively.

For the private partner, this means that the commercial viability of the Kigali Bulk Water PPP does not directly depend on the efficiency of WASAC's retail operations. This fact gives the private partner and its investors strong comfort that they will be able to cover their operating costs and fully recoup their investment over time. But the concern raised by this arrangement is that if too much project risk has been left with a public partner who cannot effectively mitigate it, the government eventually might be motivated to insist on adjusting, renegotiating, or even terminating the contract. This is a well-known vulnerability of BOT and BOO contracts that first manifested itself acutely with widespread government renegotiations of IPP contracts during the East Asian Financial Crisis in the late 1990s (Gray and Schuster 1998). Criticisms of the project by Rwanda's Auditor General have apparently not led to widespread public calls for the BOT contract to be renegotiated. But criticisms of that nature represent risks that may have future relevance for the Kigali project and for similar projects in other countries.

## **5. Financial Viability**

Before committing large-scale public resources to the detailed development of a PPP, most governments require a preliminary assessment of a project's likely financial viability or "bankability." These assessments compare the expected costs to operate, maintain, and replace assets with the benefits of the project using market prices. "Bankability" means that from a commercial lender perspective, the project can be financed, built, and repaid with an acceptable level of risk. Unlike a socioeconomic cost-benefit analysis that evaluates a project in terms of public benefits, a bankability assessment simply judges whether or not a project is likely to be financeable. By reaching financial closure in 2017 Kigali Bulk Water confirmed its bankability in this sense, and this is undoubtedly one major reason why the project is assumed to have generated demonstration effects likely to motivate replication. But a year or two after the start of commercial operations, how would public and private sector observers evaluate the project's financial viability?

One early perspective on a project’s financial viability is provided by the amount and type of investment that a private partner is willing to risk in the deal. This signals the likely degree of private sponsor confidence in the project and a judgment on the likelihood that project risks are manageable. Private equity, the riskiest form of private investment, reflects high levels of confidence in the project. Shareholder loans represent private commitment, but somewhat less confidence in project viability because shareholder loans, even if subordinated, are classified as liabilities and thus have a higher claim on assets than equity investments. Private commercial debt sourced for the project also signals a degree of private partner confidence in the project. But a private investment project financed with low levels of private equity and debt sourced exclusively from DFIs or MDBs begins to raise questions about the commercial viability of the project, as well as why traditional public investment was not used instead of opting for a slower and more expensive PPP project. The question is particularly relevant in this case because the Rwandan government was easily able to access concessional or near-concessional funding from donors or MDBs.

Some funding details of the Kigali project have not been made public but the general funding structure can be pieced together from various studies and reports (e.g., MIGA 2015; MIGA 2018; UNCDF 2018b; GIF 2018). An estimated breakdown of total project costs, including the costs of preparation, is provided in Table 2. The original total project cost was US\$75 million (IFC 2015). The forwarding infrastructure was removed from the project and made the responsibility of WASAC in order to reduce costs. AfDB provided WASAC with a US\$14 million concessional loan to cover the cost of those assets (AfDB 2017). EAIF and AfDB provided US\$41 million in 18-year debt to finance project capital costs. A donor-capitalized trust fund managed by PIDG contributed an upfront capital grant of US\$6 million to close what was termed a project “viability gap.” The government also granted a US\$3 million tax refund to the private partners. The total cost of project preparation has not been publicly disclosed but would include the government’s fee payments to IFC PPP Advisory, more than four years of PPIAF-funded technical assistance, as well as at least US\$1 million in donor funding channelled to IFC via a PIDG-managed trust fund known as “DevCo” (UNCDF 2018b). News media accounts reported that several other bilateral donors were also involved (Zawya 2015). A conservative preparation cost estimate of US\$8 million would be consistent with AfDB’s reporting on minimum average preparation costs for first-time projects in new sectors (AfDB 2013).

**Table 2. Kigali Bulk Water PPP, Estimated Total Project Funding, 2017**  
(USD millions)

<u>Amt</u>	<u>Type</u>	<u>Source</u>
41	Loans to the private partner	AfDB & EAIF (PIDG)
14	Loan to WASAC*	AfDB
6	Capital grant	Donors (via PIDG)
8	Project preparation	Government & donors
3	Tax refund	Government
11	Shareholder loan & equity	Private partner
83	Total	

\*For the project’s “forwarding” infrastructure.

Source: Author’s compilation from published reports.

Of particular interest to both public and private sector observers would be the fact that the total private financial contribution to the project costs of US\$83 million was limited to US\$11 million, which presumably included a sizeable shareholder loan as well as an equity contribution. The balance, or about 87 percent of total project cost, was sourced from donors, a DFI, an MDB, and the Rwandan government. This leverage ratio—the amount of private investment leveraged by public money—is particularly low, especially relative to the substantial project costs detailed in the sections above. Research by the Overseas Development Institute (ODI) has found that leverage ratios achieved by DFIs and MDBs in blended finance transactions in low-income countries are indeed lower than expected. On average, donors, DFIs, and MDBs contribute 73 percent of blended finance deals in low-income countries in order to leverage 27 percent from the private sector (Attridge and Engen 2019). Most of the public and private observers of the Kigali Bulk Water PPP may not have known or cared that the project achieved a leverage ratio of less than half the global average as calculated by ODI. But even a rough back-of-the-envelope calculation would have suggested to observers that private investment in the project was relatively low, compared with concessional support from the government and development partners. This fact, plus the long and expensive preparation process, and the ongoing criticism of the project by the Auditor General, must have raised serious questions in the minds of some observers regarding the project's long-term financial viability.

## **CONCLUSION: WHAT THE KIGALI BULK WATER PROJECT DEMONSTRATES?**

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The characteristics chosen for this case study are all visible project features that would attract attention from public and private observers with at least some interest in undertaking projects of a similar nature. The characteristics are particularly important for governments because they match the project features that most governments focus on in deciding whether or not to allow the development of PPPs for public services. These characteristics all appear to be likely sources of demonstration effects—if such effects actually exist in the sense of motivating behavior.

However, in the case of Kigali Bulk Water PPP, none of these characteristics are likely to encourage project replication without as much or even more concessional support from development partners as benefitted this project. Subsidized financial support from development partners made project preparation affordable for both public and private partners, and allowed the private partner to mitigate some of the risks associated with an expensive PPP by making only a minimum amount of private investment. Advice from development partners reversed three decades of World Bank recommendations regarding the type of private participation most needed in Rwanda's water sector. Development partners backed that recommendation by encouraging government acceptance of the project's high cost-benefit ratio, questionable value for money justification, and project risk sharing that strongly favored the private partner. Even casual project observers would have been aware of the importance of this support because so many development partners were involved in the project and most of them undertook extensive efforts to publicize their own roles in

facilitating the success of what they all claimed to be a ground-breaking project, eminently worthy of replication elsewhere.

With all of this in mind, the project might have produced some kind of demonstration effect, but it is not clear if such an effect would be primarily positive or negative in terms of motivating replication. On the one hand, Kigali Bulk Water signals that development partners have an appetite for projects of this kind, and might be willing to endorse or even actively support such projects in other situations. On the other, achieving a similarly coordinated mixture of donors, DFIs, and MDBs, all providing blended finance to support a greenfield water supply project of this kind, would be extremely difficult in many other developing countries, much less low-income countries. And of course this kind of replication does not help achieve the MDB goal of using demonstration effects to reduce concessional support as replication proceeds.

## **POSTSCRIPT: THE FUTURE OF DEMONSTRATION EFFECTS**

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There are signs that some members of the development community are already taking a more evidence-based approach to an understanding of demonstration effects and project replication. And this effort may become more pronounced as stock taking precedes in the wake of the SDG failures. As the Kigali Bulk Water PPP reached financial close in 2017, IFC was already re-considering its understanding of demonstration effects as it developed its new organizational strategy, eventually issued as “IFC 3.0: Creating Markets and Mobilizing Private Capital” (IFC 2020). The new strategy called for IFC to dramatically increase long-term finance commitments as well as the share of its work in IDA and fragile or conflict-affected countries.

The need to achieve these new objectives motivated IFC to develop more accurate methods of anticipating and measuring the market-building consequences of its work. This effort precipitated a shift away from the simplistic expectations reflected in the work of IFC’s PPP Advisory for example, that demonstration effects from random, one-off transactions would be enough to encourage market development in the form of project repetition and scale-up. IFC eventually reconceptualised its approach to the identification of anticipated project impacts, paying much closer attention to several “market creation channels” in addition to project demonstration effects, such as promoting competition, establishing enabling frameworks, and building skills and capacity that open markets to new opportunities. This new approach was formalized in IFC’s “Anticipated Impact Measurement and Monitoring (AIMM)” system, which began pilot application in July 2017 (IFC 2019).

One of the key conclusions of the research behind AIMM was that individual projects only rarely have significant and immediate effects on market development. Projects can have an incremental impact on market formation, but more than one intervention is usually necessary to move a market to a higher level of development. Single projects typically cannot address all of the underlying constraints that investors face in different environments. And project work must clearly and consistently recognize that demonstration effects are not always positive and can inhibit market entry.

For the IFC, all of this has meant investing more time and money in strategically designed and managed “upstream” work involving long-term programmatic efforts to strengthen the market creation channels needed to generate tangible market impacts and sustainable changes: “Upstream activity is broadly defined as all activity that lays the ground work for development of a particular sector or project, enabling it to attract private sector investment” (IFC 2020, 8). IFC’s new emphasis on upstream work means less exclusive focus on the “downstream” preparation of opportunistically selected one-off projects, in the hopes that someone else will replicate them. Among other things, this has led to strong coordination of IFC’s project preparation facilities, PPP Advisory and InfraVentures, with IFC’s new Upstream Department, forcing the PPFs to take a longer-term, more strategic perspective on project preparation.

SDG stock taking may lead to efforts to better understand complex phenomena like private investment catalysation. In turn, this may temper future efforts to set unrealistic, “do everything” development targets like the SDGs for poor countries, which can only be reached with massive amounts of private investment. A more measured approach to poverty reduction and infrastructure service improvements might emerge from this stock taking process, with a longer-term but more achievable perspective and less incentive to grasp at intuitively attractive but unproven investment mobilization tools like demonstration effects. Such an approach might also mean that the huge amounts of ODA used by hundreds of project preparation facilities around the world to subsidize the preparation of randomly selected private investment projects in developing countries might be put to better use supporting the broader sector reform and capacity building efforts that the IFC seems to be more heavily investing in under “IFC 3.0.”

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