

# The Last Mile: Connecting MCC Investments to End Users

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## Introduction

Over the past decade, the world population's access to key productivity-enhancing infrastructure—power, water, transport, irrigation, etc.—has significantly grown. But sizable segments remain left behind. Over 675 million people live without access to electricity—8 out of 10 in rural areas—and 2.2 billion lack safely managed drinking water (IEA, 2023; UN, 2023). In its growth analytics and project designs, MCC investments in infrastructure often aim to reach these underserved groups, with the goal of unlocking growth and reducing poverty. Such efforts, however, can fail to cover the “Last Mile,” the critical physical, technical, institutional, and financial elements that sustainably connect infrastructural services to households, businesses, farms, schools, and clinics.

The salience of the Last Mile to economic development is straightforward (Ashraf et al., 2016; World Bank, 2004). But while it often evokes remote or underserved areas and traditional questions of equity and access, this Topic Note conceives the term more broadly to include the incentives and constraints that influence end users' ability and willingness to connect, including technologies, costs, tariffs, enforcement, maintenance, and management. Ideally, when preparing an investment, end users should figure explicitly into its design and function, reflecting the voices and needs of a community's diverse constituency. The interface between infrastructure and end users, or put bluntly “where the rubber meets the road,” not only shapes the dimensions and magnitude of any resulting economic activity but also informs MCC's estimation of an investment's economic returns, a key element in informing project design.

## Why is the last mile so long?

Underlying the challenge of connecting end users to public services is the role of government. When the marginal cost of service lies between the private and social marginal benefit, government may justifiably intervene. Yet unlike profit-seeking firms, which supply private goods to consumers via functioning markets, governments face complex incentives and institutional challenges in overcoming market failures and delivering public services, whether in the form of health care, education, or infrastructure. The supply and quality of delivery hinges on a variety of incentives, including salaries, monitoring, rules and autonomy, and pro-social motivations (Muralidharan et al., 2021; Rasul and Rogger, 2018; Finan et al., 2015; Duflo et al., 2012; Besley and Ghatak, 2007). Partnering government with the private sector, a strategy that leverages the unique capabilities of both sides, is one strategy that can orient incentives more optimally (World Bank, 2018).

Beyond simply services, ensuring that physical infrastructure maximizes potential benefits introduces additional wrinkles. Here enter complex engineering and managerial requirements, costly but necessary maintenance, uncertain revenue streams and budgets, and, relatedly, the difficult choice of location and beneficiaries (OECD, 2021; World Bank, 2018). Layered on top are government (and donor) tendencies to prioritize big-ticket first-mile investments, such as water treatment and storage facilities, at the expense of equally vital but less lumpy and programmatically idiosyncratic last mile connections. Meanwhile, some last-mile connections often prove to be ill-conceived, poorly priced, or poorly consulted with stakeholders, e.g., building out unaffordable household water connections rather than centralized neighborhood kiosks, pushing service further out of reach (Blume et al., 2015).

## Tensions in delivering Last Mile services

In developing economies with limited resources, delivering public infrastructure faces stark tradeoffs across multiple dimensions. The physical location and design of an investment is arguably the first choice. Power sector planners, for example, must decide where to install distribution and drop-down lines, weighing dense urban areas that are more cost effective against isolated rural areas where needs for electricity access are arguably greater. Even within urban areas, spatial variation in willingness to pay may push investments into higher income neighborhoods that promise greater and more reliable revenue streams to sustain the service. Equivalent considerations arise when balancing commercial against household and social uses, including schools and clinics, inasmuch as factories and businesses consume power at scale and generally pay their bills more reliably, thereby strengthening a utility's financial standing.

More granularly, planners must decide where public infrastructure stops and private hardware begins. In the power sector, distribution networks usually fall within government's purview, but streetside drop-down lines that ultimately connect the grid to firms and houses present a gray area, as do meters, ready boards, and interior wiring. Utilities must contend with the reality that a large segment of end users are either unable or unwilling to bear the upfront costs of these "last yard" connections with implications for uptake, revenues, and financial sustainability. Water utilities must similarly judge whether piping water all the way into private households is a cost worth bearing, or if water kiosks and other more centralized delivery points are more financially viable. Access to information and communication technology infrastructure and digital services may face similar challenges.

Irrespective of income, geography, or extent, the question of prices and payments presents challenges. For most utilities, no single tariff can both recover costs and prove affordable to all consumers. Instead, utilities must assess whether cross-subsidies among users are feasible, or rely on state treasuries to support social tariffs.<sup>1</sup> Government must similarly weigh the social cost of disconnecting services that present a drain on resources or simply generate no revenues. Lurking behind these considerations is the endogeneity of service quality to revenues, and the risk that low-quality service, even when readily accessible and affordable, can diminish uptake and ultimately threaten a utility's bottom line. The utilities' limited ability and incentives to measure and monitor service quality adds an additional layer of complexity affecting both customers' willingness to pay and the utilities' ability to generate new demand for services.

### **How does MCC confront the Last Mile?**

MCC, as a significant grant funder of infrastructure projects, is no stranger to these challenges. (*See Case Studies 1 and 2 below.*) Achieving the goals of connecting households, businesses, and social institutions to public infrastructure requires a level of attention and detail that dwarfs the simple, lumpy installation of big infrastructure. Close collaboration with local communities, a nuanced understanding of government and utility relationships, and a keen sense of the size and end-use of the service's demand help fit an investment to purpose but also command budget resources and time that are often in short supply. Several issues stand out.

- **Project Scale** Given that compact budgets generally dictate the magnitude of its investments—and not the other way around—MCC must first decide on a project's feasible scale. For example, MCC could fund a modest but complete first-to-last mile investment, e.g., multiple solar powered mini-grid installations that serve a cluster of villages and firms, that guarantees connectivity and

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<sup>1</sup> Virtually all of West Africa's power utilities are insolvent in part because tariffs do not recover costs and federal budgets cannot allocate the sums necessary to sustain social tariffs. Similarly, budgets for road maintenance are thin, and strategies to cross-subsidize users, e.g., tolling heavy trucks, tend to succeed on high traffic arteries.

ultimately impact but potentially at the expense of unrealized scale efficiencies. Alternatively, MCC may support a first-mile component of a scaled-up strategic investment, e.g. a nationwide power generation, transmission, and distribution network, but with dependencies across multiple donors, government budgets, and the private sector, leaving the Last Mile question in the hands of others or simply unresolved. Not only does this weigh on the likelihood of benefits actually materializing, it also colors MCC's estimates of benefits and the overall returns on its investment.

- **Valuation methodologies** MCC's estimate of Last Mile-associated benefits hinge on specific valuation methodologies for particular services, e.g. high-quality electricity or paved roads. Willingness to pay studies, which often inform MCC's power sector investment CBAs, have their roots in valuing environmental amenities or product attributes and often suffer from biased responses, omitted benefits and costs, and aggregation effects, leading to under (or over) estimated benefits. Road benefits methodologies, e.g. the Highway Development Model 4 (HDM4), focuses on travel time and vehicle operating costs of road users, omitting other benefits streams to users, not to mention the larger local economic benefits of road investments.
- **Time horizons** MCC's 5-year clock and incentive system favors large, lumpy investments that can be quickly built and launched. MCC's statute limits its engagement over longer horizons, introducing the risk that its investments will degrade post-compact. Notwithstanding MCC's capacity building efforts to help utilities and ministries better operate, maintain, and finance infrastructure assets, the possibility of significant benefits going unrealized looms over each investment.
- **Public-private partnerships** MCC has spearheaded public-private partnerships (PPPs) that embed incentives for private management to operate publicly owned assets. Again, these activities tend to favor first-mile investments, including tolling major highways, border crossing concessions, and other spaces where the gap between a project's cost and private willingness to pay is relatively small. While sustainable, such agreements tend to convert public goods into rivalrous, excludable private goods, which in turn reduces accessibility.

### Questions for the EAC

Given the challenges of the last mile, MCC looks to the EAC for "lessons from past development experience" and innovations that deserve greater attention in our analytics and compact development. The questions fall under two main umbrellas.

#### ***What strategies and instruments can help MCC ensure its goal of realizing Last Mile benefits?***

1. MCC budgets for infrastructure typically favor capital-intensive works that are centralized, lumpy, and quickly disbursed, features which last-mile investments typically lack. Should MCC explicitly elevate the Last Mile in its investment budget and design to equate the marginal social benefit to the marginal cost? Or should it focus on its core competencies and, naively or not, assume partner governments (or other donors) will tend to the Last Mile? What responsibility, if any, should MCC bear with respect to achieving Last Mile benefits that fall outside its specific investment's scope? Should MCC partner with other complementary donors to ensure last mile service delivery?
2. Public-private partnerships are popular strategies for covering the last mile. How can MCC leverage PPPs in the interests of the general public and the poor in particular? What role do regulatory and legal institutions play in the context of negotiating and governing PPP contracts? Can results-based finance (RBF) strategies support these goals?
3. How should subsidies figure into investment design? And what are the market failures that justify public provision of infrastructure services that could be supplied by private actors?

***How can MCC better model and forecast the magnitude and distribution of benefits when designing its investments in light of challenges posed by the Last Mile?***

4. MCC often must contend with dependencies among its projects and other actors', including government, donors, and the private sector. These dependencies carry implications for MCC investments' success, particularly in reaching end users and maximizing their uptake. How should MCC regard such dependencies in its work and account for their uncertainties when designing programs and estimating their impacts?
5. Service quality often hinges on policy and institutional factors, including a utility's financial solvency and its operational capacity, regulatory independence and capacity to determine optimal tariffs. How should MCC weigh the risks of a weak institutional environment for its investments, and how should this inform the scope of its activity?
6. MCC often relies on willingness to pay (WTP) studies, often costly undertakings, to estimate an investment's benefits to end users, a key input into its economic rate of return calculations. But well-known shortcomings in these studies can give misleading impressions of benefits' size and distribution. For example, consumer demand is not just a function of prices, but long-standing behavioral practices and information gaps. In the presence of these, how should MCC address the risk of low estimated demand (based on WTP studies) for specific infrastructural services, when assessing program design, sustainability, and its estimated benefits? What other approaches to benefit valuation exist, and how do they compare to WTP?

## Case Studies of Last Mile Connections in MCC Investments

### 1. Power Sector Investments in Senegal

In the electricity sector, two physical components typically comprise Last Mile connections: (1) the “drop-down” connection from the grid to the building’s meter and (2) the connection from the meter to the lightbulb, i.e., interior wiring, outlets, switches, etc. Not only can the process of installing (1) and (2) be costly, both in terms of equipment and application fees, but indirect costs can also be prohibitive, including accessing the nearest utility office, fees for copies of leases, or even simply obtaining valid IDs. Subsidies alone do not solve the problem. In Tanzania, MCC subsidized 80% of drop-down connections costs only to see connection rates modestly climb from 18% to 31%, in part due to the remaining cost of interior wiring.

In light of this experience, MCC’s Senegal Power Compact Access Project, signed in 2018, introduced fully subsidized connections for any household within 35 meters of the existing grid, saving consumers hundreds of dollars, and also addressed additional barriers.

- **Low supply of equipment and staff** The local utility did not possess an adequate inventory of meters and connection packages for the targeted 12,700 households. Moreover, it lacked the staffing necessary for installation within the compact’s 5-year clock, much less the contractual requirements to respond to customer requests within 5 days or verify work within 10 days of completion prior to energizing lines.
- **Bureaucratic obstacles in rural, poorer areas** Consumers reported a raft of burdensome steps to obtaining their connection: traveling to regional utility offices to submit paperwork; supplying proof of address or location, uncommon in rural areas; understanding how to find and engage an electrician to purchase materials and install interior wiring while ensuring compliance with the utility’s specifications; traveling again to the regional utility office to report that interior wiring had been completed; and waiting for the interior wiring verification.
- **Low information environment** Many marketing materials were only available in French or Wolof, languages that aren’t spoken or read by many consumers. Poor understanding of certain concepts, e.g. kilowatt hours, rates, fees, etc., led some consumers to mistrust the utility and ultimately hamper uptake, as well as knowledge gaps in energy efficiency, consumption management, and safety. Due diligence also found low availability of electric equipment, low awareness of their potential productive uses, and limited access to credit for purchases.

To tackle these challenges, MCC allocated \$3.3 million to support utility-side improvements, \$4 million for an education and behavior change campaign, and \$4 million for a productive use component. Using these funds in 2024, the utility will digitize connection requests, make them accessible on-line, and visit each newly grid-connected village to collect requests and payments for the initial connection. The utility also agreed to accept different types of location-proving documentation. The education and behavior change campaign, beginning in August 2024, aims to increase consumers’ knowledge of electricity consumption, safety, tariff rates, the connection process, interior wiring, and productive use opportunities.

MCC further agreed to fund interior wiring for up to 6,000 households in 2023.<sup>2</sup> Identified using the Government of Senegal Register of Poor and Vulnerable Households, potential recipients were further narrowed on additional vulnerability criteria, including number of dependents, household head gender, or disability status. The local utility will work with qualified electricians to install interior wiring in households identified from the register and be reimbursed with compact funds.

## **2. Water and Sanitation Investments in Lusaka, Zambia**

MCC's first compact in Zambia (\$354 million) extended and rehabilitated water, sanitation and drainage infrastructure in peri-urban Lusaka, and strengthen the institutional capacity of operational and governing authorities. The intended economic benefits of the sanitation infrastructure hinged in part on health benefits which could only materialize via households connecting to the new network. Such connections were further necessary to reach the required minimum flow for the sewer system to operate well.

Early due diligence raised concerns over whether people in peri-urban Lusaka would connect to the sanitation network, based on very low connection rates in other similar programs. The utility notably struggled with customer outreach and education and lacked a system for affordable, sustainable connections. Separately, the area's large share of rental properties posed an additional challenge, as landlords and tenants faced different interests and incentives for uptake. Roughly half of peri-urban Lusaka's population lived in extreme poverty. The cost of a sanitation connection, even if paid over 10 years, would amount to 18% of the income of low-income households among the targeted population.

MCC did not fund the last-mile connections in its initial design and investment. Instead, MCC required the Government of Zambia to develop a Sanitation Connection Action Plan (SCAP) for the locality hosting MCC's works which would make funds available to those who could not afford to connect to the MCC-funded sanitation infrastructure. The project also included an "Innovation Grant" program that included funding for private sector and NGO solutions that could enable households to install water closets and plumbing. Separately, an institutional reform activity was designed to provide technical assistance to the utility's peri-urban unit to strengthen its capacity to address the connections challenge over the long-term.

The SCAP eventually proposed social marketing, utility institutional support, models for water closets, a government-funded, utility-managed, revolving zero-interest 10-year loan scheme to help consumers overcome the financial barriers to connection, and later a plan to pre-finance water closets and plumbing for the poorest plot owners. During compact implementation, however, connections from the network to the household were included in the works contract, to ensure that the connections would get made.

As it turned out, the contract to lay the sewer network had to be cancelled and reprocured, causing implementation delays. Most of the SCAP could not come to fruition during the compact lifetime since the network in the designated area was not completed by the compact's end date in late 2018. The Government of Zambia continued implementation post-compact, and as of 2024, approximately 5,500 out of 7,800 connections had been made. Approximately 70% of these connections are flushing into the system.

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<sup>2</sup> MCC typically invests in public goods. But the line between public and private can be grey, as in the case of interior wiring, which is an excludable and rivalrous good, but is also costly enough to preclude net-welfare enhancing household uses and production. In Senegal, due diligence revealed that, absent any subsidies for interior wiring, uptake would remain low and diminish the project's estimated benefits.

Star Report Zambia (2020), an MCC summary final assessment of the compact, underscored the importance of connections, stating that the SCAP “wasn’t laid out until the compact was already in implementation, and the resources to design and execute the program...were insufficient...The importance of user connections to the infrastructure suggests that more emphasis should have been placed on utility policies and practical support to help households overcome affordability barriers that made it difficult for them to connect to the network and build an appropriate toilet.”

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