

BEYOND THE GAP

How Countries Can Afford the Infrastructure They Need while Protecting the Planet

Policy Note 1/6

Overview of Infrastructure Investment Needs in Low- and Middle-Income Countries by 2030

In low- and middle-income countries, infrastructure—defined here as water and sanitation, electricity, transport, irrigation, and flood protection—falls short of what is needed to address public health and individual welfare, environmental considerations, and climate change risks, let alone achieve economic prosperity or middle-class aspirations. How can this situation be reversed? This policy note is drawn from *Beyond the Gap: How Countries Can Afford the Infrastructure They Need while Protecting the Planet*, edited by Julie Rozenberg and Marianne Fay, Sustainable Infrastructure Series (Washington, DC: World Bank, 2019). The report not only contends that the focus should be on the service gap—not the investment gap as is typically the case—but also offers a careful and systematic approach to estimating the funding needs (capital and operations and maintenance) to close the service gap. The results presented here were developed specifically for this report, based on clearly specified access and climate goals and using numerous scenarios to explore both uncertainty and the consequences of policy choices.

Policy Note 1—one of six drawn from *Beyond the Gap*—provides an overview of the report's key findings. Policy Note 2 focuses on water and irrigation, Policy Note 3 focuses on the power sector, Policy Note 4 focuses on transport, Policy Note 5 focuses on flood protection, and Policy Note 6 focuses on climate change.

Beyond the Gap aims to shift the debate regarding investment needs for infrastructure away from a simple focus on spending more and toward a focus on spending better on the right objectives using relevant metrics. It does so by offering a careful and systematic approach to estimating the funding needs (capital as well as operations and maintenance) to close the service gap for low- and middle-income countries (LMICs) in water and sanitation, transportation, electricity, irrigation, and flood protection.

The main innovations of our work relative to other estimates of investment needs are the following: (a) the results presented here were developed specifically for this report, following a consistent approach and timeline and based on clearly specified goals; (b) numerous scenarios were used to explore both uncertainty and the consequences of policy choices; (c) the estimates included not just new investments, but also the costs of replacement capital as well as the costs for maintaining new and existing infrastructure; and (d) estimates were made for both access and climate goals. This policy note highlights the key findings of the report.

How much countries need to spend on infrastructure depends on their goals, but also on the efficiency with which they pursue these goals

New infrastructure could cost LMICs anywhere between 2 and 8 percent of gross domestic product (GDP) per year to 2030, depending on the quality and quantity of service aimed for and the spending efficiency achieved to reach this goal (table 1).

TABLE 1 Infrastructure spending needs are shaped by goals and efficiency

Infrastructure spending needs on capital and maintenance in LMICs, by scenario and sector, 2015–30

Scenario and sector	% of GDP		2015 US\$ (billions)	
	Capital	Maintenance	Capital	Maintenance
<i>Low-spending scenario</i>				
Electricity	0.9	0.3	300	110
Transport	0.53	1.1	160	550
Water and sanitation	0.32	0.48	120	30
Flood protection	0.06	0.014	20	10
Irrigation	0.12	—	40	—
Total	2.0	1.9	640	700
<i>Preferred scenario</i>				
Electricity	2.2	0.6	780	210
Transport	1.3	1.3	420	460
Water and sanitation	0.55	0.75	200	70
Flood protection	0.32	0.07	100	20
Irrigation	0.13	—	50	—
Total	4.5	2.7	1,550	760
<i>High-spending scenario</i>				
Electricity	3.0	0.8	1,020	280
Transport	3.3	2.1	1,060	700
Water and sanitation	0.65	0.75	230	70
Flood protection	1.0	0.14	340	40
Irrigation	0.2	—	100	—
Total	8.2	3.8	2,750	1,090

Note: Costs in U.S. dollars are discounted with a 6 percent discount rate. LMICs = low- and middle-income countries; — = maintenance costs for irrigation infrastructure are included in capital costs.

In the low-spending scenario, ambitions are modest, and efficiency is high. As a result, LMICs only need to spend 2 percent of GDP per year on new capital. In this scenario, countries would (a) focus on providing universal access to *basic* water and sanitation services by 2030; (b) focus on expanding access to electricity to satisfy basic needs (enough to power a few light bulbs in rural areas) and make energy efficiency a priority; and (c) concentrate investments on efficient public transportation and use high fuel taxes to make individual transport less attractive.

The high-spending scenario is characterized by high ambition and low efficiency. Countries need to spend 8 percent of GDP per year on new capital to provide universal access to *safe* water and sanitation (treated water and sewerage systems) and the highest tiers of electricity services (enough to power domestic appliances). This investment would also satisfy an ever-growing demand for transport, generated by urban sprawl and individual use of cars.

With the right policies, investments of 4.5 percent of GDP will enable LMICs to achieve the infrastructure-related Sustainable Development Goals and stay on track to limit climate change to 2°C

The report identifies policy mixes that could enable LMICs to achieve universal access to water, sanitation, and electricity; greater mobility; improved food security; better protection from floods; and eventual full decarbonization—while limiting spending on new infrastructure to 4.5 percent of GDP per year.

The ambitious goals and high efficiency of this “preferred scenario” require smart policies and good planning:

- Countries account for long-term climate goals to avoid expensive stranded assets later.
- They invest in renewable energy.
- They combine transport planning with land-use planning—resulting in denser cities and cheaper and more reliable public transport—and develop reliable railway systems that are attractive to freight.
- They deploy decentralized technologies in rural areas—such as minigrids for electricity and water purification systems that are powered by renewable energy.

Thus, the focus for the international community and climate finance should be on helping countries to achieve decarbonization objectives at the lowest possible cost by supporting better planning and policies.

Investing in infrastructure is not enough; maintaining it matters

Improving services requires much more than capital expenditure. Ensuring a steady flow of resources for operations and maintenance is a necessary condition for success. In the low-spending scenario, spending to maintain existing and new infrastructure doubles total spending needs, while in the high-spending scenario, spending on maintenance increases total needs by 50 percent. In our preferred scenario, LMICs would need to spend 2.7 percent of GDP per year to maintain their existing and new infrastructure, in addition to the 4.5 percent of GDP for new capital (table 1). But good maintenance generates substantial savings, reducing the total life-cycle cost of transport and water and sanitation infrastructure by more than 50 percent.

Global numbers hide disparities between regions

In dollar terms, in all three scenarios, about 50 percent of total capital investment needs happen in Asia, 20 percent in Africa and the Middle East, 20 percent in Latin America and the Caribbean, and the rest in Europe and Central Asia. However, in GDP terms, Africa and the Middle East have the highest needs—ranging from 2.9 percent of GDP in the low-spending scenario to 12.5 percent of GDP in the high-spending scenario, with the preferred scenario at 6.4 percent of GDP (table 2).

How do these needs compare with what countries actually spend?

It is remarkably difficult to figure out how much countries actually spend on infrastructure—especially given that fiscal accounts do not typically report consolidated information on infrastructure investments. However, a recent World Bank report (Fay and others 2019) provides the first consistently estimated data set on infrastructure investments in LMICs, building on proxies drawn from national accounts data, fiscal data, and the World Bank’s Private Participation in Infrastructure (PPI) database.

It finds that LMICs spend between 3.38 percent of GDP (lower bound) and nearly 5 percent (upper bound), with a central estimate of around 4 percent for 2011 (table 3). But these averages mask considerable differences across regions, ranging from 2.5 percent of GDP in Sub-Saharan Africa to 5.7 percent in East Asia and Pacific, using the central estimate. Moreover, East Asia and Pacific spends the most across all estimates.

TABLE 2 Some regions will have to invest a lot more than others

Infrastructure spending needs on capital and maintenance in LMICs, by scenario and region, 2015–30

Scenario and region	% of GDP		2015 US\$ (billions)	
	Capital	Maintenance	Capital	Maintenance
<i>Low-spending scenario</i>				
Africa and Middle East	2.9	1.1	150	50
Asia and Pacific	1.6	2.1	310	420
Eastern Europe and Central Asia	1.1	2.1	30	70
Latin America and Caribbean	1.9	0.7	140	50
<i>Preferred scenario</i>				
Africa and Middle East	6.4	1.8	320	90
Asia and Pacific	4.0	2.5	790	500
Eastern Europe and Central Asia	5.8	3.0	180	100
Latin America and Caribbean	3.3	1.0	250	80
<i>High-spending scenario</i>				
Africa and Middle East	12.5	2.0	620	100
Asia and Pacific	7.0	2.7	1,380	530
Eastern Europe and Central Asia	5.2	2.7	160	80
Latin America and Caribbean	7.6	1.2	580	90

Note: The Africa and Middle East region is the combination of the Sub-Saharan Africa and Middle East and North Africa regions. The Asia and Pacific region is the combination of the South Asia and East Asia and Pacific regions. LMICs = low- and middle-income countries.

TABLE 3 East Asia and Pacific tops the regional list for infrastructure investments

Summary estimates for infrastructure investment as % of GDP, by scenario and region, 2011

Region	Lower-bound estimate	Central estimate	Upper-bound estimate
East Asia and Pacific	5.36	5.72	6.71
Europe and Central Asia	1.51	2.73	4.36
Latin America and Caribbean	2.02	2.39	3.22
Middle East and North Africa	1.67	4.79	4.73
South Asia	3.59	4.42	4.25
Sub-Saharan Africa	1.87	2.54	3.47
LMIC average	3.38	4.11	4.99

Source: Fay and others 2019.

Note: Estimates were named lower-bound, central, and upper-bound based on the LMIC average. For some regions the central estimate is actually the highest. Averages are weighted by GDP shares. LMIC = low- and middle-income country.

The Middle East and North Africa region and South Asia also spend the most, while Latin America and the Caribbean and Sub-Saharan Africa spend the least. This is particularly worrisome for Sub-Saharan Africa, given its low GDP and low infrastructure endowment.

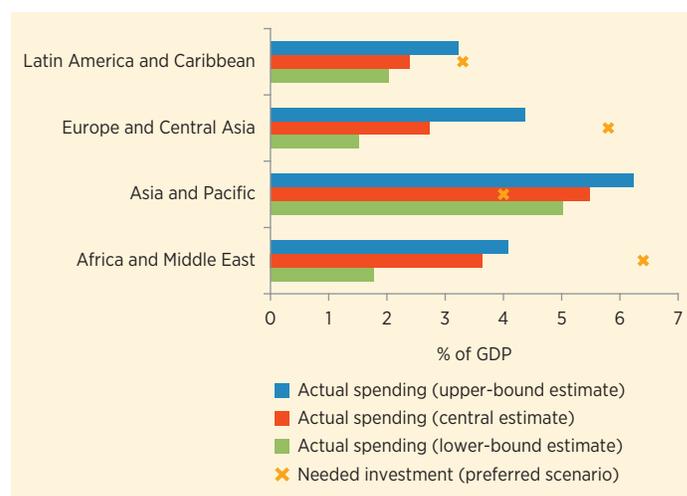
Not only does East Asia spend the most relative to its GDP, it also spends the most in absolute terms—accounting for more than half (55 percent) of infrastructure spending in LMICs. These high outlays are driven largely by China. At the other end of the spectrum is Sub-Saharan Africa, which accounts for a mere 4 percent of total LMIC spending on infrastructure.

Satisfying future infrastructure needs will require a big increase in spending in all regions but Asia

How do current outlays on infrastructure compare with the amounts that will be needed to satisfy future infrastructure needs? To answer this, we compare our historical (2011) estimate of actual spending with our estimate of spending needs under the preferred scenario for 2015–30 (figure 1). Our results show that all regions—except Asia—would need to increase significantly the share of GDP allocated to infrastructure. The gap is highest in Africa, with its urgent need to expand access to infrastructure, and in Europe and Central Asia, which faces high costs to replace aging infrastructure (especially in the power sector).

FIGURE 1 Meeting infrastructure needs in all regions, except Asia, will require much higher spending

Summary estimates for infrastructure investment as % of GDP in 2011, compared to investment needs in preferred scenario



Source: Fay and others 2019.

Note: Actual spending is estimated for 2011, while needed investment is estimated as an annual average over 2015–30. The Africa and Middle East region is the combination of the Sub-Saharan Africa and Middle East and North Africa regions. The Asia and Pacific region is the combination of the South Asia and East Asia and Pacific regions.

Spending better is important

In all regions, the public sector dominates infrastructure spending, accounting for 87–91 percent of infrastructure investments—albeit with wide variation across regions, from a low of 53–62 percent in South Asia to a high of 98 percent in East Asia (table 4). Given tight fiscal space, closing the gap—or at least narrowing it—will require spending as efficiently as possible.

TABLE 4 The public sector accounts for the bulk of infrastructure investments in all regions

Public spending as a % of total infrastructure investments, by scenario and region, 2011

Region	Lower-bound estimate	Central estimate	Upper-bound estimate
East Asia and Pacific	98	98	98
Europe and Central Asia	70	83	89
Latin America and Caribbean	71	75	82
Middle East and North Africa	83	94	94
South Asia	53	62	60
Sub-Saharan Africa	66	75	82
LMIC average	87	89	91

Source: Fay and others 2019.

Note: LMIC = low- and middle-income country.

Reference

Fay, Marianne, Sungmin Han, Hyoung Il Lee, Massimo Mastruzzi, and Moonkyoung Cho. 2019. “Hitting the Trillion Mark: A Look at How Much Countries Are Spending on Infrastructure.” Policy Research Working Paper 8730, World Bank, Washington, DC.