

# Infrastructure Spending to Meet the SDGs and Debt Sustainability - How to Square the Circle?

2023 ANALYSIS



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# **CHAPTER 1**

### **1 INTRODUCTION**

Since 2020 and the onset of the COVID-19 pandemic, there has been significant concern regarding an "African debt crisis" from rising debt levels. This debt crisis narrative is however not new and pre-dates the pandemic. Yet, these narratives not only ignores African agency, but takes debt as a starting point – rather than assessing what the debt is seeking to address. Often, for African countries, this is vital infrastructure. Across the continent, governments have sourced financing for a plethora of individual and regional infrastructure projects in alignment with their national development goals and the African Union's Agenda 2063.

The COVID-19 pandemic has placed increased financial pressure on African economies. At Development Reimagined, we estimate that African governments spent USD 130 billion to address COVID-19's economic and health effects. Financing socioeconomic policy measures and the costs associated with reduced economic activity and vaccine procurement have resulted in constrained fiscal space levels of debt. Further, increased debt levels have hindered the access of African countries to capital markets through credit rating downgrades when debt rises. This is further exacerbated due to the deeply flawed process of the Debt Sustainability Assessment (DSA) by the IMF and the World Bank which sets a limit of 60% of debt-to-GDP despite little quantitative evidence to support the threshold.

At the same time, African countries must still address large investment gaps, especially in infrastructure, to stimulate post-COVID-19 economic recovery, meet the UN Sustainable SDGs by 2030 and contribute to the AU Agenda 2063. Indeed, in line with "accelerating implementation of the African Continental Free Trade Area (AfCFTA)", the African Development Bank (AfDB) has marked a 7%-10% annual growth rate over the next 40 years as the benchmark for African countries to meet UN Sustainable Development Goals (SDGs) and the agenda 2063. Across different sectors in African economies, infrastructural development is an anchor necessary to sustainably support such goals.

However, information on infrastructure financing gaps is scarce. Analysis by the AfDB is not regularly updated and is often on a continental or sub-regional level rather than breaking it down to a country and sector level. To this end, DR has designed an econometric model to predict the infrastructure investment spending needs of four African countries from 2021 to 2030 (under two scenarios). We have three key objectives.

Forecast the future investment needs of Ethiopia, Zambia, Chad and Kenya;

To illustrate the size of the financing needs of these countries with reference to their current capabilities and Gross Domestic Product (GDP);

Take stock of infrastructure needs in reference to the constraints of the DSA.



We selected four countries to conduct the forecasting analysis on, these are Ethiopia, Zambia, Kenya and Chad (henceforth, "the countries under consideration"). The reason for selecting these countries is that they have all – or have been rumoured to in the case of Kenya – applied to the Common Framework and are classed as "high" or "in debt distress" by the IMF and World Bank's Debt Sustainability Analysis (Table 1).In light of recent developments, namely Ghana's January 2023 Common Framework application and the country's external debt default, we include Ghana in the set of countries under consideration. Ghana's infrastructure forecasting results are quoted from our May 2022 Infrastructure Financing Needs report. However, for comparison, the underlying timeframe of 2021-2030 is shared by all five countries under consideration.

Table 1: The relationship between the countries under consideration, incl. the DSA, the Common Framework and forecasted growth rates.

Country	DSA Rating (Nov-22)	Common Framework Requested	Govt. Debt (2021) USD	Debt-to-GDP (2021) %	Forecasted Growth Rate % (IMF)
Ethiopia	High	✓ Requested Feb 2021	52,56 billion	52.95	5.30
Zambia	In debt distress	✓ Requested Feb 2021	25,39 billion	119.14	4.00
Kenya	High	X No request to date	74,97 billion	67.83	5.10
Chad	In debt distress	✓ Requested Jan 2021	6,6 billion	55.96	3.40
Ghana	High	✓ Requested Jan 2023	65 billion	82.12	2.80

Each country's infrastructure needs vary over time. When assessing national access to infrastructure and availability of it to a country's entire population, any level below capacity is insufficient. The resultant gap between what is in place and what is needed reflects each country's *distance to go* in terms of infrastructural development. Infrastructure investment needs are therefore guided by a range of development indicators, some of which we summarise below.





Figure A. "Distance to go" as measured by three development metrics.

Access to electricity in rural and urban areas is an essential foundation for social and economic development. In the pursuit of Sustainable Development Goals (SDGs), a country's capacity to generate electricity and transmit it efficiently must increase in order to meet growing population needs. In the countries under consideration, access ranges from as low as 11% in Chad to 86% in Ghana. This indicates the levels of electricity infrastructure investment required to improve access in the countries under consideration.

Access to safely managed drinking water minimizes the chances of preventable disease outbreaks such as cholera. In addition to daily human consumption needs, clean water supplies are also key for agricultural production, an important source of livelihood in the countries under consideration. As illustrated below, access is relatively low in the five countries analysed, reinforcing the need for prioritization of infrastructural investment in the years ahead.

**Population living in poverty** reflects a mismatch between basic living needs and incomes available to sustain these needs on a daily basis. This gap has direct and indirect relations with the levels of infrastructural development in a country, with inadequate infrastructural investment increasing the likelihood of poverty levels increasing in a country. Ranging from 23% in Ghana to



54% in Zambia, much work needs to be done in each country to reduce the proportion of the population living in poverty.

Country	Current Annual Investment Trend (avg, USD)	Current Annual Investment Trend (% of GDP)	SDG Target Annual	SDG Target Annual Investment (% of GDP)
Ethiopia	12 – 16,9 billion	8 - 12	23,6 – 34,8 billion	17 – 25
Zambia	4,4 – 6,4 billion	15 – 22	7,4 – 10,8 billion	26 - 38
Kenya	5,6 – 8,3 billion	6 – 8	14,5 – 21,4 billion	14 – 21
Chad	1,9 – 2,9 billion	16 - 25	3,2 – 5,6 billion	28 - 49
Ghana <sup>*</sup>	2,9 – 4 billion	4 – 5.5	7 – 9,1 billion	9,7 – 12,6

Table 2: Summary of results for average annual infrastructure investment needs by country.

\* Infrastructure investment needs forecasted in May 2022

Based on current infrastructure investment trends, USD 1,9-USD 16,9 billion will need to be invested each year in the five countries listed in Table 2. For context, this will translate to a GDP share of 4-25%.

With 2030 SDGs in mind, each country's infrastructure investment needs multiply in varying proportions. Annual investment needs will range from USD 3,2-USD 34,8 billion, meaning that the equivalent of 9.7-49% of GDP will need to be set aside each year solely for infrastructural development. In monetary terms, Ethiopia has the largest annual and cumulative infrastructure investment needs. But relative to historical economic output (as measured by GDP), Chad will have a greater commitment to make.

The scale of financial commitments required above highlights the urgent need for greater levels of infrastructure financing needed in these countries but more importantly, indicate how significant a role infrastructural development plays towards broader economic growth. More years of infrastructure under-investment will widen each country's investment needs, compromising progress towards achieving 2030 SDGs.

Using an exponential smoothing algorithm, Table 3 summarizes forecasted debt-GDP ratios in Zambia, Kenya, Chad and Ghana based on data from a 2000-2021 debt-GDP dataset. What stands out from these findings is the steadily expanding debt burden brought by infrastructural and other economic commitments countries may face in the years ahead. Perhaps in disproportionate measures, GDP also grows each year. But as a result of (among other underlying causes) investment gaps in Table 2, debt-GDP ratios weigh in favour of debt increases at the expense of overall economic output.



Country*	Zambia	Kenya	Chad	Ghana
2022	145.45	69.90	56.23	90.89
2023	144.33	75.65	57.88	97.06
2024	153.51	80.44	59.53	103.88
2025	159.05	84.90	61.15	111.66
2026	168.81	89.35	63.11	118.19
2027	176.32	94.44	65.21	122.52
2028	184.76	98.67	67.42	121.71
2029	194.79	103.00	71.10	126.10
2030**	204.27	107.85	73.16	131.34

Table 3: Forecasted debt-to-GDP ratios under current investment trends.

\*insufficient data available for Ethiopia

\*\*forecast approach restricted to current trends

# **CHAPTER TWO:**

# 2 METHODOLOGY

DR collected historical data from 2000 to 2020 (inclusive) and forecasted the infrastructure investment spending of the four countries between 2021 and 2030.

Guided by similar attempts to forecast national infrastructure investment needs in Asia, Latin America and at a global level, we broadly consider infrastructure as transportation, energy, telecommunication as well as water and sanitation. A second key consideration is the time horizon of our forecasting model. To varying extents, the 2000-2020 window chosen is an ideal balance between the statistical reliability needed in a time series analysis, with an expected level of economic stability that comes with analysing relatively short periods. The longer a timeframe adopted, the higher the likelihood of shifts in underlying economic conditions; shifts which in turn compromise the reliability of forecasts made.

Lastly, the forecasting endpoint (2030) factors in two points-the time and statistical reliability tradeoff outlined above as well as 2030 being the target year for SDGs to have been met worldwide. Accordingly, our forecast is split into two scenarios, each with its own set of conditions observed.

The two scenarios examined were:

- 1. Current trend or Business as Usual (BaU) scenario: Future infrastructure investment needs are assessed regarding the trend implied by the current infrastructure investment in these countries; and
- Meeting the SDGs scenario: Future financing needs are calculated regarding what is needed from these countries to achieve their national and international pledges. The shortfall between the two scenarios is the infrastructure investment gap.



# **CHAPTER THREE:**

## **3 DATA ANALYSIS**

#### 3.1 Scenario 1: Business as Usual (BaU)

**Overview:** We provide an overview of the results of our forecast in relation to the infrastructure investment spending forecasted in Scenario 1: Current trend or Business as Usual.

**Low - High Unit Costs:** Using the low unit costs of infrastructure investment, we forecast that the cumulative total infrastructure investment between 2021 and 2030 ranges between USD 119,58 billion and USD 169,33 billion for Ethiopia, USD 43,77 billion and USD 64 billion for Zambia, USD 56 billion and USD 82,74 billion Kenya and USD 18,97 billion to USD 29,35 billion for Chad.

**GDP:** Based on the results, Ethiopia, Zambia, Kenya and Chad, will need to spend on average 6%-25% of their GDP per annum on infrastructure investment up to 2030 based on what is implied by their current trend of infrastructure investment.



#### 3.1.1 ETHIOPIA:

Our forecasting revealed that Ethiopia's Current Trend of Investment Cost between 2021 and 2030 stands at USD 119.6 - USD 169.3 billion (low-high cost). In terms of average annual spend, current trends of spending equate to USD 12 – USD 16.9 billion or 8%-12% of GDP. Total investment cost (Current Trend) can be broken down into sectors (Figures 1 and 2).

Population dynamics are a fundamental consideration for a country's infrastructure investment needs over time. In 2020, population estimates had Ethiopia at 117,9 million people, making it one of Africa's largest populations. Subsequently, the capital required to support Ethiopia's growth and development is relatively large when compared to other countries on the continent.

Between 2000-2020, Ethiopia's total population grew at an average of 2.80% per year, with 18% living in urban areas. Economic output per person grew 676% in the period, a positive indication for the country's capacity to fund its increasing needs. Looking ahead and judging by current trends, we project a 1,2 million growth in the country's population between 2020-2030. This puts into context the scale of infrastructure investment needed to support anticipated growth without compromising adequate supply of and access to infrastructure per capita.

Consequently, and as illustrated in the infrastructure sub-categories above, expansion of road networks, increase in energy generation and distribution and broadening of telecommunications are the biggest infrastructure investment needs Ethiopia will face between 2021-2030.



Figure 1: Ethiopia's total investment costs under scenario 1.

Figure 2: Ethiopia's investment split by infrastructure sub-category under scenario 1.



#### 3.1.2 ZAMBIA:

Our forecasting revealed that Zambia's Current Trend of Investment Cost between 2021 and 2030 stands at USD 43,7 - USD 64,1 billion (low-high cost). In terms of average annual spend, current trends of spending equate to USD 4,4 - 6,4 billion or 15 - 22% of GDP. Total investment cost (current trend) can be broken down into sectors (Figures 3 and 4).

With a 2020 population of about 18,9 million people, Zambia's infrastructure investment needs are comparatively lower than Ethiopia's but still significant relative to Zambia's current investment trends across the infrastructure sub-sectors. The population increased at a fairly steady rate, at an average of 3.22% between 2000-2020. Output per person was also moderate at 170% but suggested a lag in developmental capacity to fund growing infrastructure needs when compared with Ethiopia. The urban-rural composition has been an almost even split at 45% as of 2020, indicating a need to balance infrastructure investment flows in both directions.



Figure 3: Zambia's total investment costs under scenario 1.

Figure 4: Zambia's investment split by infrastructure sub-category under scenario 1.

Guided by the infrastructure sub-categories above and Zambia's current investment trends, we forecast road network expansion as well as energy generation and distribution as 92% of the country's infrastructure investment needs.



#### 3.1.3 KENYA:

Our forecasting revealed that Kenya's Current Trend of Investment Cost between 2021 and 2030 stands at USD 56 – USD 82,7 billion (low-high cost). In terms of average annual spend, current trends of spending equate to USD 5,6 - USD 8,3 billion or 6% – 8% of GDP. Total investment cost (Current Trend) can be broken down into sectors (Figures 5 and 6).

Kenya is among the top 10 African countries by population estimates. But similar to Zambia and based on 2020's population estimate of 51.99 million, Kenya had less than half of Ethiopia's population. Between 2000-2020, Kenya's output per person grew 350%, nearly half of Ethiopia's 676% in the same period. However, 2020 estimates show that Kenya's output per person of USD 1,936 was ahead of Ethiopia's USD 919, indicating a greater capacity to fund investment needs as the population grows. Accordingly, these figures reflect differences in infrastructure investment needs and the potential to support them across the continent and within various regions.

Between 2000-2020, Kenya's rural-urban population composition has been slightly titled in favour of the latter at 51%. As a result, the country's current infrastructure investment trends mirror Zambia's need to strategically direct investments towards both rural and urban areas.



Figure 5: Kenya's total investment costs under scenario 1.

Figure 6: Kenya's investment split by infrastructure sub-category under scenario 1.

As illustrated in the infrastructure sub-categories above, Kenya's current infrastructure trends reveal that over 80% of investments need to be channelled towards increasing road network networks as well as energy generation and distribution.



#### 3.1.4 CHAD

Our forecasting revealed that Chad's Current Trend of Investment Cost between 2021 and 2030 stand at USD 19 – USD 29,3 billion (low-high cost). In terms of average annual spend, current trends of spending equate to USD 1,9 - USD 2,9 billion or 16% - 25% of GDP. Total investment cost (Current Trend) can be broken down into sectors (Figures 7 and 8).

In our four-country dataset and based on 2020 estimates, Chad had both the lowest population and overall economic output per person at 16,64 million and USD 644, respectively. Averaging 78% between 2000-2020, the country's population has to a large extent been rural-based.



Figure 7: Chad's total investment costs under scenario 1.

Figure 8: Chad's investment split by infrastructure sub-category under scenario 1.

The population imbalance outlined above is further illustrated by Figures 7 and 8. Based on current infrastructure investment trends, the bulk of Chad's investment is needed in road network development.

It should also be noted that economic output per person varies over time and (in addition to other variables) competes in terms of national investment priorities. Consequently, infrastructure investment is not consistently allocated the amount of investment needed for construction, maintenance or expansion purposes. Set against national and global development targets, the patterns and levels of investment in a country, therefore, highlight where and how much intervention is required.



#### 3.2 Scenario 2: Meeting the SDGs

**Overview:** We provide an overview of the results of our forecast in relation to the infrastructure investment spending forecasted in Scenario 2: Meeting the SDGs.

Low - High Unit Costs: Using the low unit costs of infrastructure investment, we forecast that the cumulative total infrastructure investment between 2021 and 2030 ranges between USD 235,64 billion and USD 348,36 billion for Ethiopia, USD 73,77 billion and USD 108,01 billion for Zambia, USD 145,11 billion and USD 214,11 billion for Kenya and USD 32,38 billion to USD 55,99 billion for Chad.

**GDP:** Based on the results, Ethiopia, Zambia, Kenya and Chad, will need to spend on average 14%-49% of their GDP per annum on infrastructure investment up to 2030 to meet the SDGs.



#### 3.2.1 ETHIOPIA:

Our forecasting revealed that for Ethiopia to reach the SDGs, the total investment cost from 2021 to 2030 stands at USD 235,6 - USD 348,4 billion (low-high cost). In terms of average annual spend, to reach the SDGs Ethiopia would need to spend USD 23,6 - USD 34,8 annually, or 17% - 25% of GDP. The total investment cost to reach the SDGs can be broken down into sectors (Figures 9 and 10).



Ports:

Total Investment Cost - SDGs High Cost Estimates

Figure 10: Ethiopia's investment split by infrastructure sub-category under scenario 2.

\$60 - \$70 bn Figure 9: Ethiopia's total investment costs under scenario 2.

Rail:

Airports:

\$0.7 - \$1 bn



#### 3.2.2 ZAMBIA:

Airports:

\$0.8 - \$1 bn

Our forecasting revealed that for Zambia to reach the SDGs, the total investment cost from 2021 to 2030 stands at USD 73,8 - USD 108,1 billion (low-high cost). In terms of average annual spend, to reach the SDGs Ethiopia would need to spend USD 7,4 - USD 10,8 annually, or 26% - 38% of GDP. The total investment cost to reach the SDGs can be broken down into sectors (Figures 11 and 12).



Ports:

Total Investment Cost - SDGs High Cost Estimates.

Figure 12: Zambia's investment split by infrastructure sub-category under scenario 2.

\$15 - \$17.5 bn Figure 11: Zambia's total investment costs under scenario 2.

Rail:



#### 3.2.3 KENYA:

Our forecasting revealed that for Kenya to reach the SDGs, the total investment cost from 2021 to 2030 stands at USD 145,1 - USD 214,1 billion (low-high cost). In terms of average annual spend, to reach the SDGs Ethiopia would need to spend USD 14,5 - USD 21,4 billion annually, or 14% - 21% of GDP. The total investment cost to reach the SDGs can be broken down into sectors (Figures 13 and 14).



Airports: \$0.8 - \$1 bn

Pail: \$38 - \$44.2 bn

Figure 13: Kenya's total investment costs under scenario 2.

Ports: \$7.9 - \$9.3 bn

Figure 14: Kenya's investment split by infrastructure sub-category under scenario 2.

Total Investment Cost - SDGs





#### 3.2.4 CHAD:

Airports:

\$0.8 - \$1.1 bn

Rail:

Our forecasting revealed that for Chad to reach the SDGs, the total investment cost from 2021 to 2030 stands at USD 32,4 - USD 56 billion (low-high cost). In terms of average annual spend, to reach the SDGs Ethiopia would need to spend USD 3,2 - USD 5,6 billion annually, or 28% -49% of GDP. The total investment cost to reach the SDGs can be broken down into sectors (Figures 15 and 16).



Total Investment Cost - SDGs High Cost Estimates.

Figure 15: Chad's total investment costs under scenario 2.

Ports:

Figure 16: Chad's investment split by infrastructure sub-category under scenario 2.

# **CHAPTER FOUR:**

### **4 TOTAL INFRASTRUCTURE FINANCING GAP**

#### 4.1 INTRODUCTION

Having assessed current infrastructure investment trends in each country (scenario 1) and the levels of investment needed to meet 2030 SDGs (scenario 2), we conclude by analyzing variances in monetary value between these two scenarios based on low and high infrastructure investment cost estimates. The resultant differences calculated reveal our projected infrastructure investment gaps in Ethiopia, Zambia, Kenya and Chad between 2021-2030. These gaps are provided in terms of cumulative and annual investment needs in the 10-year period.

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#### 4.1.1 ETHIOPIA

Our forecasting revealed that Ethiopia's Total Infrastructure Gap from 2021 to 2030 stands at USD 116,1 - USD 179 billion (low-high cost). In terms of the average annual investment gap, this stands at USD 11,6 - USD 17,9 billion or 8% - 13% of GDP. The differences between the BaU Scenario and the SDG Scenario are shown in Chart 1.



Figure 17: Ethiopia's investment forecasting gap (2021-2030).



Chart 1: Ethiopia's investment forecasting gap (high-cost estimate).

Chart 2: Ethiopia's investment forecasting gap overtime (2021-2030).



#### 4.1.2 ZAMBIA:

Our forecasting revealed that Zambia's Total Infrastructure Gap from 2021 to 2030 stands at USD 30 - USD 44 billion (low-high cost). In terms of the average annual investment gap, this stands at USD 3 - USD 4,4 billion or 10% - 15% of GDP. The differences between the BaU Scenario and the SDG Scenario are shown in Chart 3.



Figure 18: Zambia's investment forecasting gap (2021-2030).







Chart 4: Zambia's investment forecasting gap (2021-2030).



#### 4.1.3 KENYA:

Our forecasting revealed that Kenya's Total Infrastructure Gap from 2021 to 2030 stands at USD 89,1 USD 131,4 billion (low-high cost). In terms of the average annual investment gap, this stands at USD 8,9 - USD 13,1 billion or 9% - 13% of GDP. The differences between the BaU Scenario and the SDG Scenario are shown in Chart 5 (high cost)



Figure 19: Kenya's investment forecasting gap (2021-2030).



Chart 5: Kenya's investment forecasting gap (2021-2030, high-cost estimate).

Chart 6: Kenya's investment forecasting gap (2021-2030, high cost estimate).



#### 4.1.4 CHAD:

Our forecasting revealed that Chad's Total Infrastructure Gap from 2021 to 2030 stands at USD 13.4 – USD 26.6 billion (low-high cost).

In terms of the average annual investment gap, this stands at USD 1.3 - USD 2.7 billion or 12 - 23% of GDP. The differences between the BaU Scenario and the SDG Scenario are shown in Chart 7.



Figure 21: Chad's investment forecasting gap (2021-2030).





Chart 8: Chad's total financing gap (2021-2030).

# **CHAPTER FIVE:**

## **5 CONCLUSIONS AND RECOMMENDATIONS**

Closing the infrastructure gap across all four countries requires a huge amount of capital, as the forecasting has demonstrated. Yet, this process is hindered by the DSA by the IMF and World Bank which has the main objective to monitor low-income countries' debt levels by classing them as either low, moderate, high or at risk of debt distress, with the majority of African countries falling in the last two categories.

However, the DSA ignores the positive side of debt – by not counting assets produced by debt - making it incomplete. Country debt can be spent on very different activities – including on investments in growth-producing assets, primarily infrastructure, which can have "spillovers" that create new growth that would not have been there otherwise. For example, a new railway project can cut travel costs and create new markets, which translates into higher productivity. Yet, none of this examination of the potential new "goods" or "assets" created by debt incurred is included in DSA.

Going forward, Development Reimagined suggests 2 key recommendations that policymakers and civil society in Borrowing countries should push for - specifically targeted at reform in the IMF and World Bank – to work better for African needs and development priorities.

<u>1.</u> The DSA should track the "positives" of debt by focusing on the quality of debt rather than just its quantity and adjust thresholds on this basis. Debt can fund growth-inducing projects. For example, African governments often borrow for capital expenditure such as infrastructure projects, including projects in energy, railway, and roads, all of which have growth-inducing spinoff effects such as creating jobs and incomes, enhancing productivity, facilitating regional and international trade and developing value and supply chains. These "endogenous growth" effects should be accounted for in the DSA.

<u>2.</u> The DSA should account for the "gap" countries have between their existing capital needs and the capital needs to achieve the SDGs. Right now, there is no way to adjust DSAs based on need. The SDGs and Agenda 2063 cannot be met without increased spending and sufficient access to concessional finance to do so.



### 6 ACKNOWLEDGEMENTS AND CONTACT DETAILS

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For further information on our forecasting, please email clients@developmentreimagined.com.