



# Large Infrastructure

Scenario Impact on Provision of Infrastructure,  
Economy, Trade and Poverty

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## Scenario Impact on Provision of Infrastructure, Economy, Trade and Poverty

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### Briefly

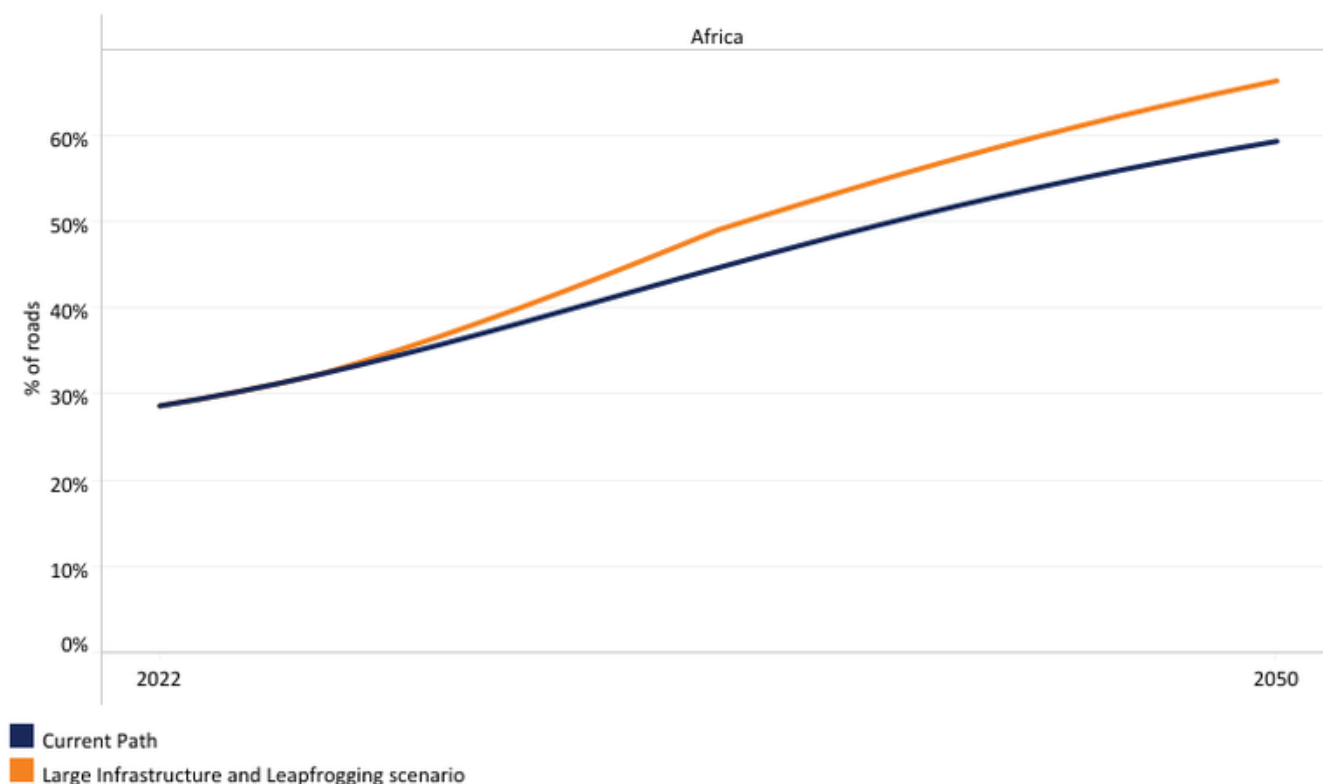
Infrastructure underpins productive activity by enabling households and firms to access goods, services, and markets. Expanding both the quantity and quality of **infrastructure** allows previously underused or untapped resources and capital to be mobilised, raising productive capacity and supporting capital accumulation. In turn, this drives economic growth, job creation and broader socio-economic development. Infrastructure is also a prerequisite for productive transformation—the process through which economies build and diffuse organisational, production and technological capabilities and reallocate capital and labour toward more productive activities.

For example, transport infrastructure enables rural agricultural workers to access higher-productivity jobs, particularly in services. In contrast, reliable energy and digital infrastructure facilitate the adoption of modern technologies in agriculture and manufacturing and support the expansion of high-productivity sectors such as financial and digital services. When combined with trade and tax reforms, infrastructure development can therefore catalyse productive transformation, yielding more sustainable and equitable economic outcomes.

### Roads

Chart 17 shows the share of paved roads in the Large Infrastructure and Leapfrogging scenario compared with the Current Path from 2022 to 2050. In the scenario, paved roads will account for 66% of Africa's total road network by 2050, which will be seven percentage points higher than the Current Path forecast of 59%. Despite this improvement, the continent's share of paved roads would remain well below South Asia's projected level of 81% in 2050.

Chart 17: Share of paved roads in Large Infrastructure and Leapfrogging scenario vs Current Path, 2022-2050



Source: IFs 8.50 initialising from WDI data

When the results are disaggregated by income group, clear differences emerge in both baseline conditions and the scale of improvement under the infrastructure scenario.

By 2050, lower-middle-income African countries will have the highest share of paved roads among all income groups. Under the Large Infrastructure and Leapfrogging scenario, the share of paved roads in this group will rise to 74%, compared with 67% under the Current Path, an improvement of seven percentage points. This will place lower-middle-income countries ahead of both low-income and upper-middle-income peers in terms of overall road paving coverage.

For upper-middle-income African countries, the share of paved roads will increase by five percentage points relative to the Current Path, reaching 69% by 2050. In contrast, low-income countries will experience the most dramatic relative improvement. Starting from very low levels of paved road coverage, the interventions in the Large Infrastructure and Leapfrogging scenario are more aggressive for this group. As a result, the share of paved roads in total road networks will increase by nine percentage points above the Current Path, reaching 52% by 2050. While this will still leave them behind higher-income groups in absolute terms, the magnitude of change highlights significant progress in closing the infrastructure gap in the scenario.

Looking at regional comparisons under the Large Infrastructure and Leapfrogging scenario, sub-Saharan Africa will reach 63% paved roads by 2050. Despite improvements—amounting to a seven-percentage-point increase over the baseline—this level will remain below the average for other developing subregions. By contrast, North Africa will achieve a

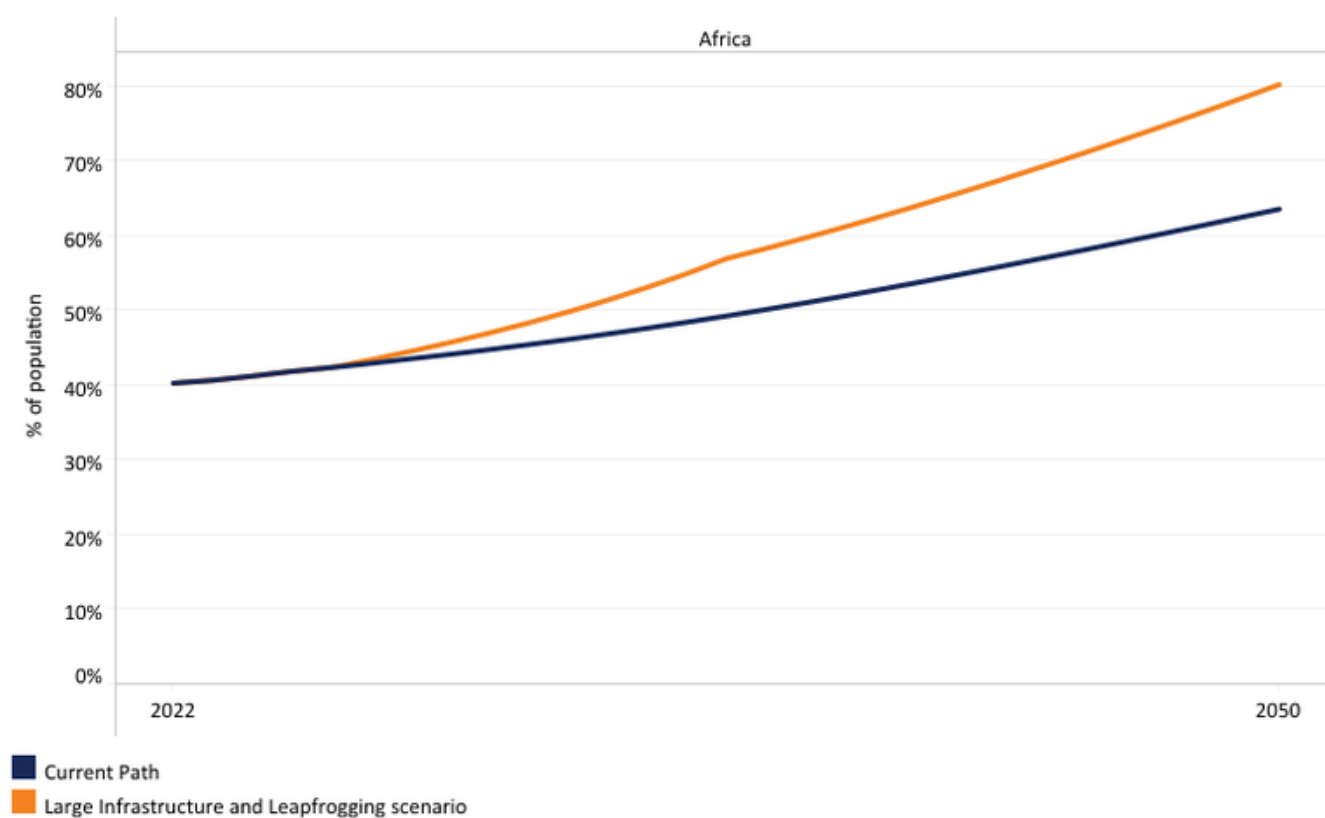
higher level of coverage, with paved roads increasing by four percentage points to 80% by 2050 under the same scenario. North Africa will be on par with South Asia by 2050. In the scenario, North Africa will continue to outperform sub-Saharan Africa in infrastructure provision.

Finally, Seychelles, the continent's only high-income country, stands out with near-universal coverage. By 2050, 99% of its total road network will be paved, reflecting both its higher income level and smaller geographic scale.

## Electricity access

Regarding electricity access, the intervention scenario delivers transformative improvements compared with the Current Path. Chart 18 shows access to electricity in the scenario versus the Current Path from 2022 to 2050. By 2050, the number of people without access to electricity will fall to 273 million under the intervention, compared with 543 million under the Current Path. In other words, the scenario will cut the number of unserved people almost in half. This will translate into a continental electricity access rate of 89.5%, substantially higher than the 79% projected on the Current Path—a gain of more than 10 percentage points.

**Chart 18: Access to electricity in Large Infrastructure and Leapfrogging scenario vs Current Path, 2022-2050**



Source: IFs 8.50 initialising from WDI data

Although the scenario will not eliminate disparities between urban and rural areas, it will significantly narrow the gap. By 2050, electricity access in urban areas will reach 97.3%, while rural access rises to 80%. The resulting 17-percentage-points gap will be considerably smaller than the 29-percentage-points gap projected under the Current Path in the same year. The scenario will also markedly reduce regional disparities within the continent. In sub-Saharan

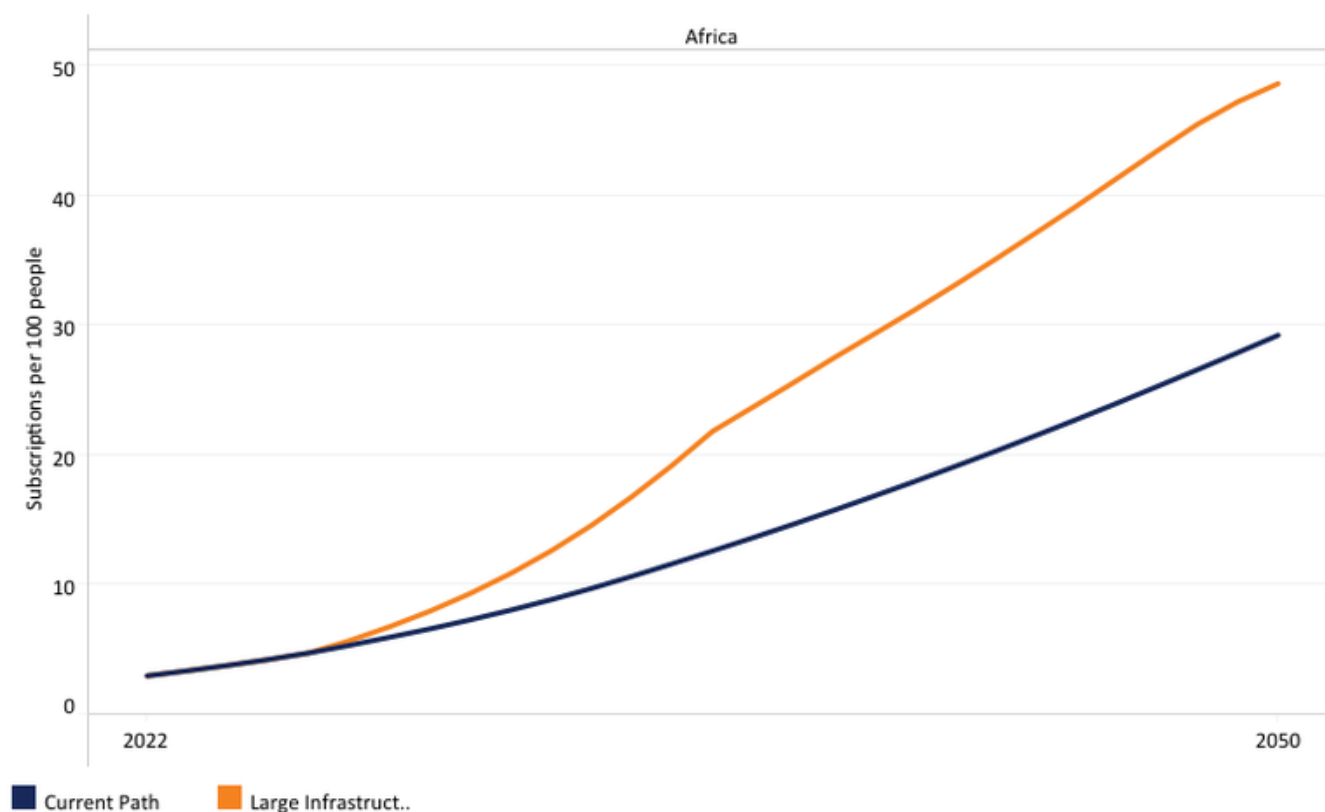
Africa, electricity access will reach 88% by 2050 under the intervention, compared with 93.7% in North Africa. The gap between the two regions will narrow to about six percentage points, less than half of the 13.7 percentage-point gap projected under the Current Path.

Overall, while universal access will not fully be achieved in the scenario, the intervention will substantially accelerate electrification, sharply reduce the number of people left behind and significantly narrow both urban-rural and regional disparities.

## Digital connectivity

The Large Infrastructure and Leapfrogging scenario will substantially accelerate progress in digital connectivity, particularly in fixed broadband adoption, while producing more modest gains in mobile broadband. Chart 19 shows access to fixed broadband across Africa in the scenario, compared with the Current Path from 2022 to 2050. Under the scenario, fixed broadband subscriptions will rise to 47 subscriptions per 100 people by 2050. This represents a dramatic improvement over the 29 subscriptions per 100 people projected under the Current Path, an increase of 18 subscriptions per 100 people. At this level, Africa would be broadly on par with the projected rate for South America, and notably ahead of South Asia. This will mark a significant shift in closing the digital infrastructure gap with other developing regions, particularly in high-capacity, fixed-line connectivity that supports businesses, institutions and high-data applications.

**Chart 19: Access to fixed broadband in Africa, Large Infrastructure and Leapfrogging scenario vs Current Path, 2022-2050**



Source: IFs 8.50 initialising from ITU data

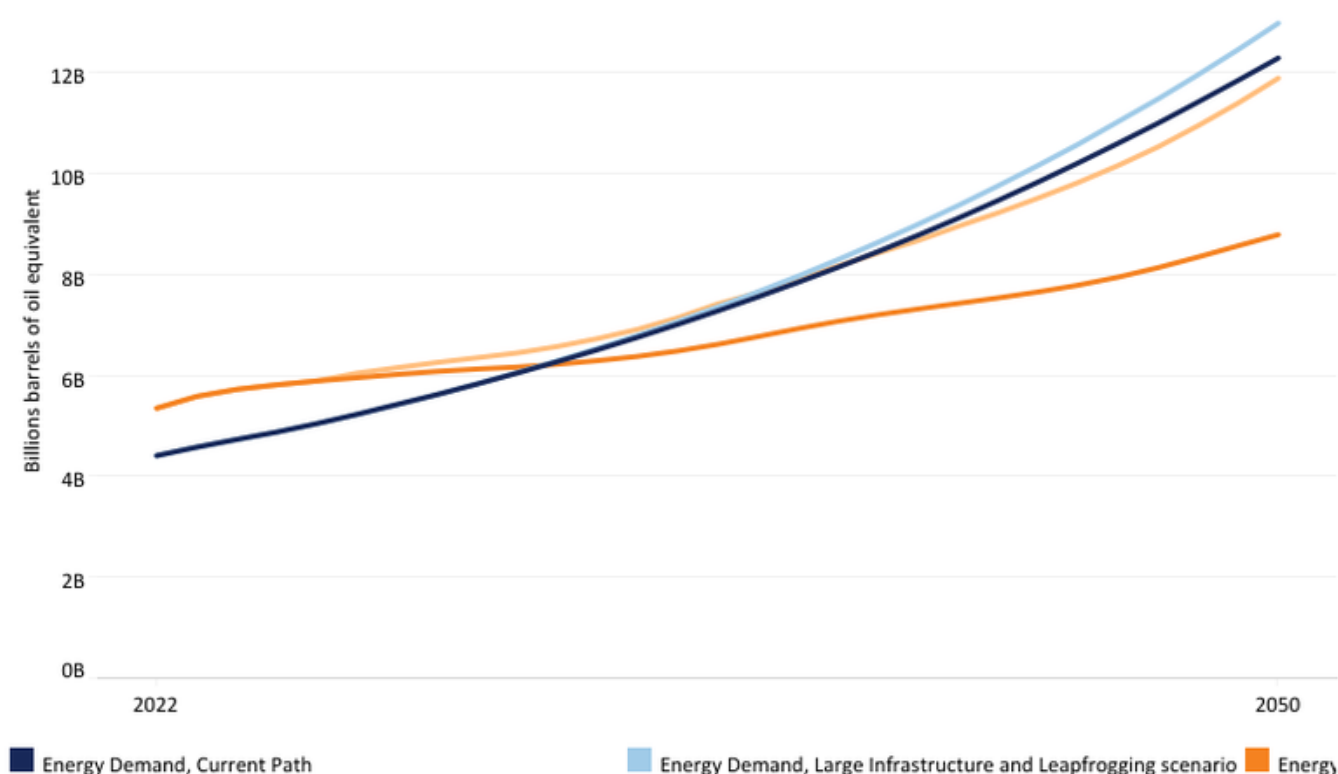
By contrast, gains in mobile broadband subscriptions will be more incremental. The intervention will raise mobile broadband penetration to 151 subscriptions per 100 people, only slightly above the 149 per 100 people projected under the Current Path. While this will still place Africa roughly on par with South America, the relatively small difference suggests

that mobile connectivity is already nearing saturation under baseline trends, leaving less room for dramatic acceleration.

## Energy

In the Large Infrastructure and Leapfrogging scenario, the gap between energy demand and production will narrow substantially, placing Africa on a more sustainable and resilient development path. Chart 20 depicts energy demand and production in Africa in the scenario versus the Current Path from 2022 to 2050. Under the Current Path, the energy deficit will reach 3.5 billion barrels of oil equivalent (BBOE) by 2050. In contrast, the scenario will reduce this shortfall to just 1 BBOE equivalent in the same year.

**Chart 20: Energy production and demand in Africa, Large Infrastructure and Leapfrogging scenario vs Current Path, 2022-2050**



Source: IFs 8.50 initialising from World Energy Outlook data

In addition, the scenario will accelerate the energy transition. The share of renewable energy in total energy production will reach 45% by 2050, compared with 34% under the Current Path in the same year. This significant increase underscores a structural shift toward cleaner energy sources.

Together, the reduced energy gap and the higher share of renewables carry important implications for sustainable development. They would strengthen energy security, lower dependence on fossil fuel imports and reduce exposure to price volatility. Expanding renewable energy also supports climate mitigation efforts, improves environmental outcomes and broadens access to affordable and reliable power—thereby fostering inclusive growth, industrial development and improved living standards across the continent.

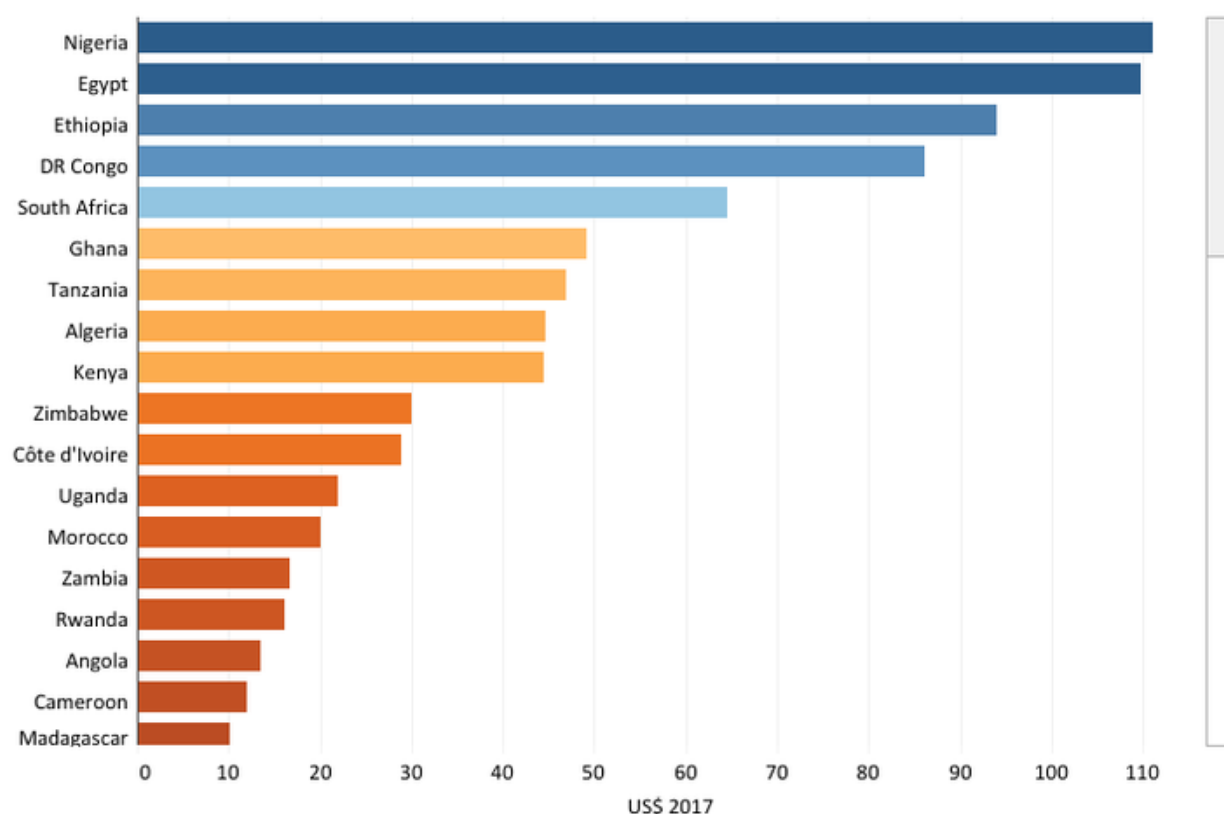
However, this apparent reduction in the energy deficit should be interpreted with caution. Much of the continent's energy production remains dominated by crude oil, which does not automatically translate into a usable domestic energy supply.

It is a raw material that must be refined before it can be used as fuel or for electricity generation. For instance, until recently, Nigeria’s refining capacity was limited and poorly maintained, preventing the country from meeting domestic fuel demand. As a result, most crude oil was exported, while refined petroleum products were imported—often at high cost and with exposure to supply disruptions. This structural mismatch between production and domestic processing capacity highlights the importance of strengthening downstream infrastructure and diversifying energy sources to ensure that production gains effectively support sustainable development outcomes.

## Economic growth

Chart 21 shows GDP (MER) in Africa in the scenario versus the Current Path for 2050. Under the Large Infrastructure and Leapfrogging scenario, Africa’s economy will grow at an average annual rate of 6% between 2027 and 2050, one percentage point higher than the 5% average growth rate forecast over the same period on the Current Path. This performance will translate into a significantly larger economy, with Africa’s GDP projected to be nearly US\$1 trillion (US\$948 billion, in 2017 dollars) higher than the Current Path forecast by 2050. All countries will see their GDP improve above the Current Path. Still, the largest economies, including Nigeria, Egypt, South Africa, Ethiopia, DR Congo, Ghana, Tanzania, Algeria and Kenya, among others, are expected to see the most significant absolute gains.

**Chart 21: GDP (MER) in Africa, Large Infrastructure and Leapfrogging scenario vs Current Path, 2050**



Source: IFs 8.50 initialising from IMF and World Bank data

When improvements in transport networks, energy supply, ports and digital infrastructure raise productivity, the resulting increase is applied to a much larger economic base in countries such as Nigeria, Egypt and South Africa. Even when percentage growth accelerates by a similar margin across countries, the dollar value of additional output is substantially higher in economies that already produce more goods and services. In addition to their larger starting base, larger African economies tend to have more diversified production structures, deeper domestic markets and stronger intersectoral

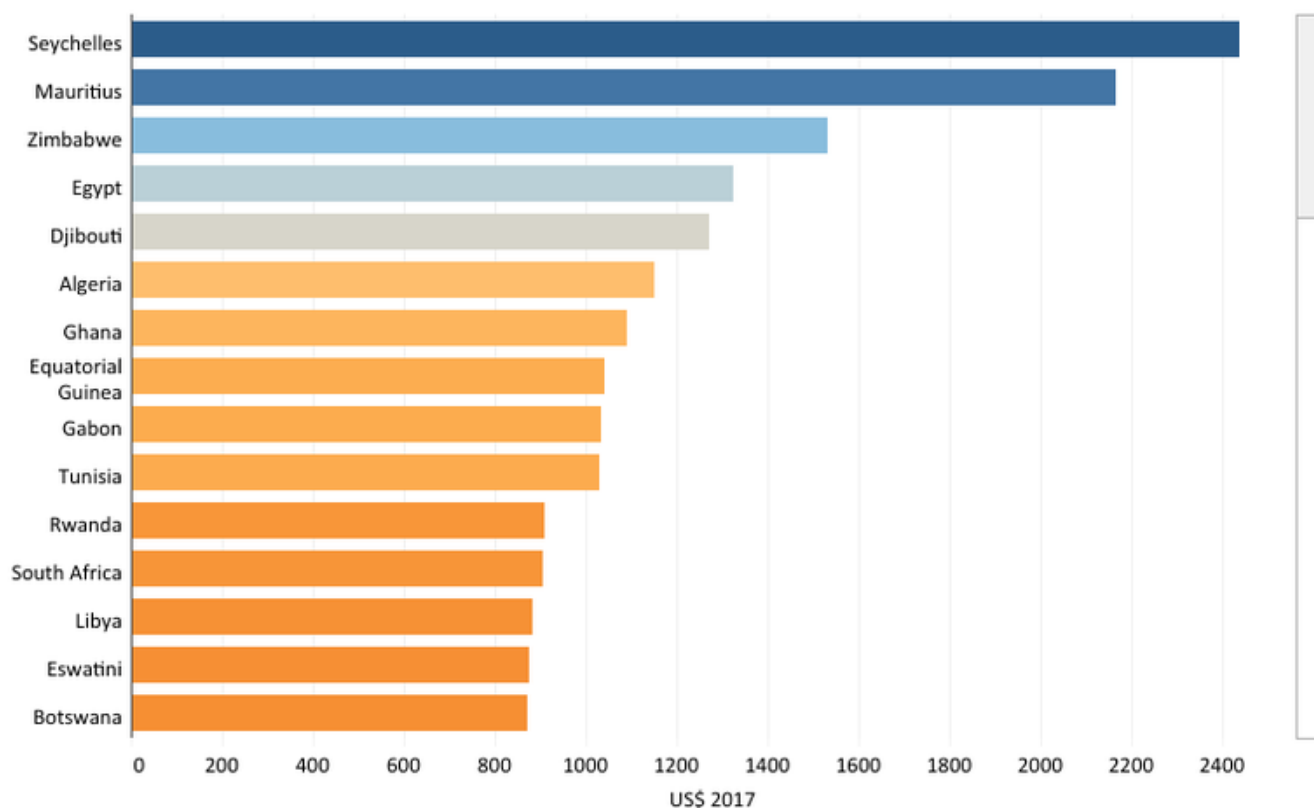
linkages. Infrastructure improvements in these contexts generate broader multiplier effects, as reduced transport and energy costs simultaneously stimulate manufacturing, services, agriculture and trade. Larger markets also attract greater private investment and are better positioned to efficiently absorb new capital, reinforcing the growth impulse. By contrast, smaller economies—often more narrowly specialised—may experience meaningful relative (percentage) gains. Still, the absolute expansion in output remains smaller because fewer sectors and firms can capitalise on the improved infrastructure at scale.

The growth-enhancing effects of infrastructure found in the Large Infrastructure and Leapfrogging scenario are in line with previous studies on the impact of infrastructure development on growth. An IMF study covering the period 1985–2014 found that an unanticipated 1% increase in public infrastructure investment raised GDP by 0.4% in the following year and by 1.5% after four years. Similarly, a recent study by the World Bank shows that a 10% expansion in transport, energy and digital infrastructure increases economic output by 0.1%, 0.5% and 0.3%, respectively, highlighting the critical role of infrastructure in boosting growth.

## Incomes

Africa's average GDP per capita (at purchasing power parity, PPP) will be about US\$510 larger in the Large Infrastructure and Leapfrogging scenario than in the Current Path in 2050. This is a notable increase as the continent's total population will 2050 exceed 2.5 billion people. The improvement in GDP per capita for each African country compared with the Current Path in 2043 is presented in Chart 22, with Seychelles (the only high-income country in Africa) and many lower-middle- and upper-middle-income countries doing exceptionally well in the scenario.

**Chart 22: GDP per capita (PPP) in Africa, Large Infrastructure and Leapfrogging scenario vs Current Path, 2050**



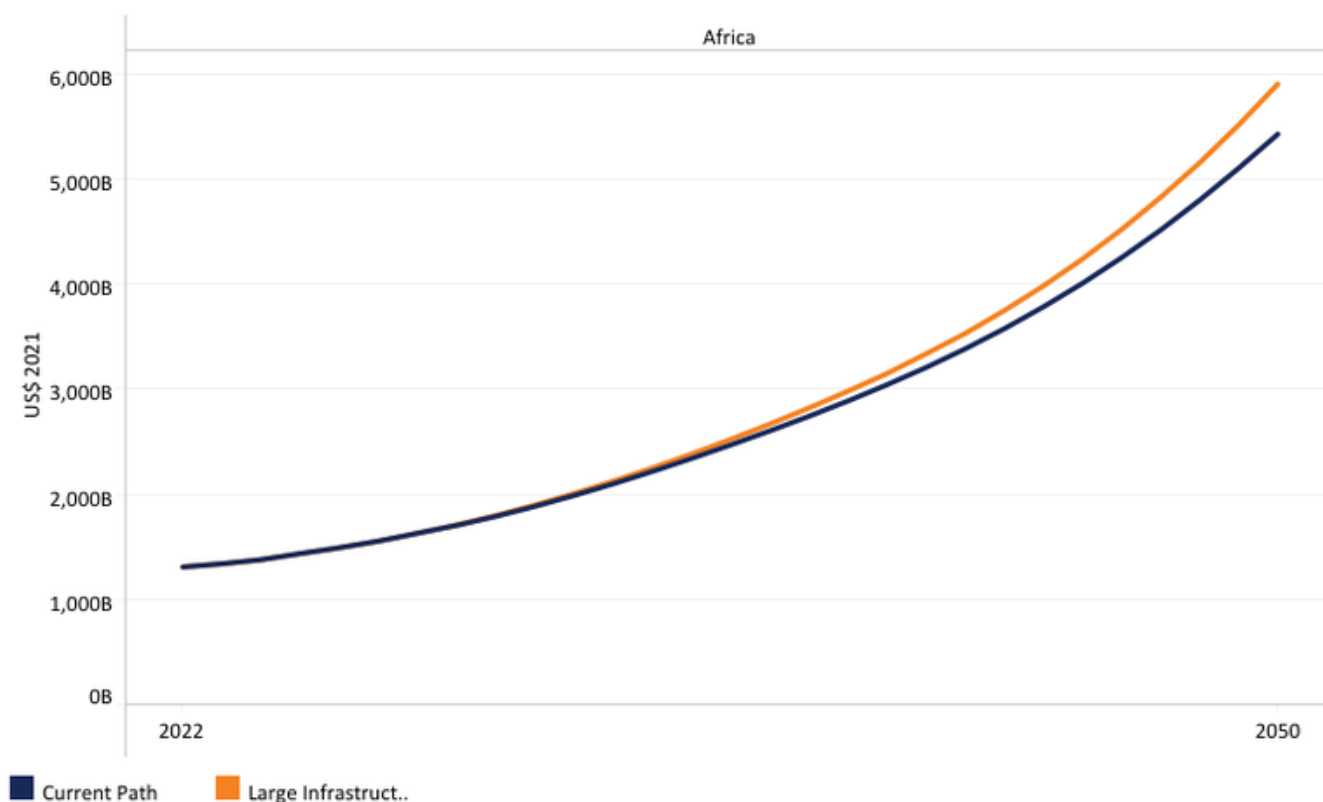
Source: IFs 8.50 initialising from IMF and World Bank data

## Trade

Chart 23 shows total trade in the Large Infrastructure and Leapfrogging scenario versus the Current Path from 2022 to 2050. Under the scenario, Africa will experience substantial long-term trade gains. By 2050, total trade volume (exports plus imports) would increase by US\$478 billion (or 9%) relative to the Current Path. Within this total, exports will rise by US\$165 billion (6.5%), while imports will grow by US\$313 billion (11%). These projections underscore the transformative potential of large-scale infrastructure investment for the continent's economic trajectory.

Such gains are closely linked to improvements across transport, energy and digital infrastructure systems. Investments in roads and railways reduce transport and transaction costs, currently more than five times higher in Africa than in other world regions, while improving connectivity between production centres and markets. Lower trade costs enhance export competitiveness, stimulate intra-African trade—particularly in processed and semi-processed goods—and increase overall export volumes. Reliable energy infrastructure enables firms to operate consistently and at lower cost, strengthening their integration into regional and global value chains. At the same time, expanded digital infrastructure facilitates e-commerce, digital payments and more efficient customs procedures, reducing barriers for businesses, especially small and medium-sized enterprises. Improved road and railway networks support structural transformation by enabling a shift from low-productivity agriculture toward higher-value manufacturing and services. By enhancing access to inputs, suppliers and consumer markets, infrastructure development raises firm productivity and fosters industrial growth. For example, operationalising regional transport corridors under the Programme for Infrastructure Development in Africa is estimated to increase exports by 11.5% and boost overall GDP growth by up to 2%. Collectively, these investments strengthen regional integration, deepen value chains and position African economies for more diversified and sustained growth.

**Chart 23: Total trade in Large Infrastructure and Leapfrogging scenario vs Current Path, 2022-2050**



Source: IFs 8.50 initialising from the World Bank and OECD national accounts data

Through higher growth and expanded trade, the scenario will also generate significant employment gains and contribute to poverty reduction. In the scenario, employment in the services and ICT sectors will increase by 2.9 million and 7.6 million, respectively, above the Current Path forecast by 2050. In contrast, employment in agriculture and manufacturing will decline, reflecting how infrastructure development raises productivity, accelerates technology adoption and reshapes the structure of labour demand across the economy.

Improved infrastructure, such as reliable electricity, broadband and efficient transport and logistics, enables the expansion of modern services and digital industries. Better power and connectivity lower entry barriers for ICT, finance, e-commerce and other knowledge-based activities, which tend to be labour-absorbing and grow rapidly once infrastructure constraints are eased. Rising incomes and urbanisation further increase demand for retail, transport, education, healthcare and other services, shifting employment toward services and ICT.

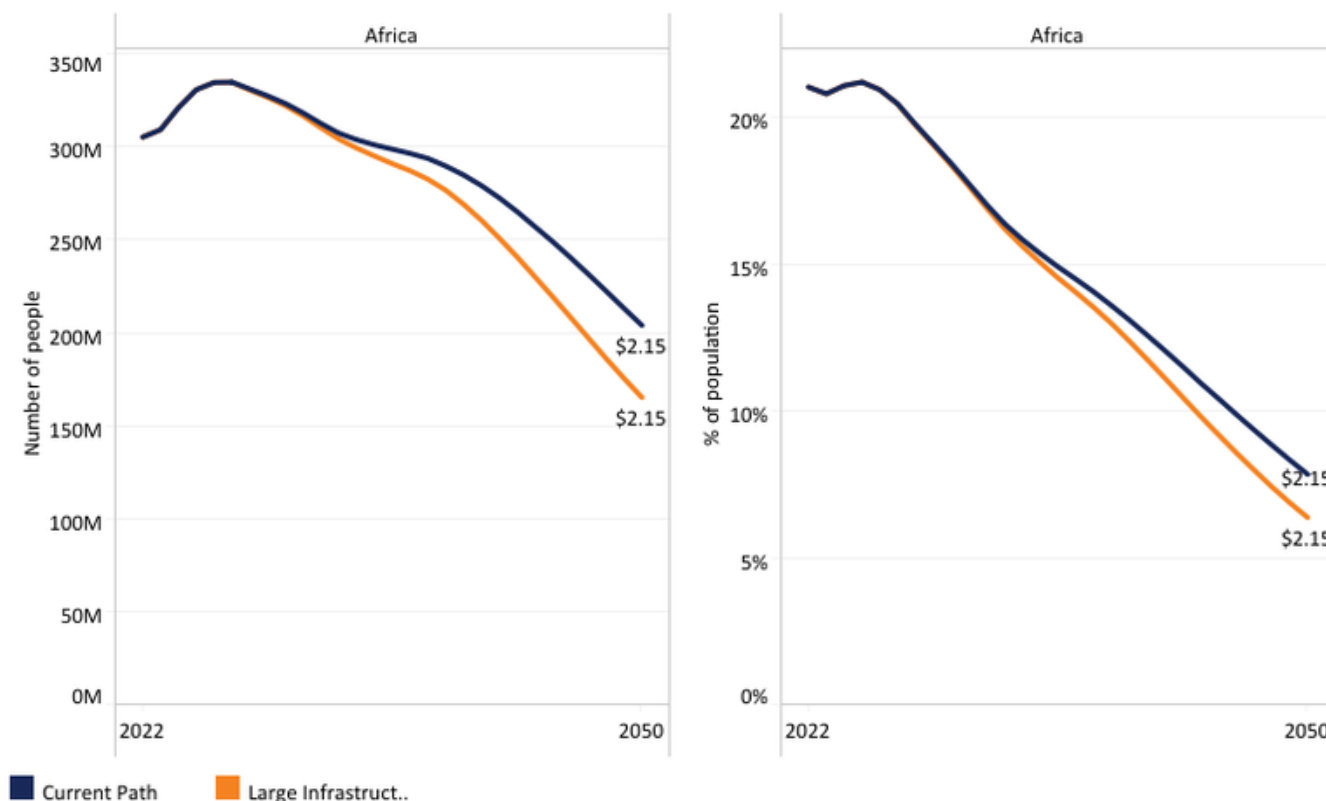
At the same time, infrastructure raises productivity in agriculture and manufacturing through mechanisation, automation and more efficient supply chains. Improved roads, irrigation, energy and logistics allow higher output with fewer workers. Although production may expand, labour demand per unit of output declines, leading to a reallocation of workers from lower-productivity sectors to higher-productivity services—reflecting the broader process of structural transformation.

This employment potential of the Large Infrastructure and Leapfrogging scenario is consistent with evidence from ongoing continental initiatives. As of 2023, projects under the Programme for Infrastructure Development in Africa (PIDA) had generated about 162,000 jobs, and employment estimates from 94 projects across 34 countries suggest that up to 15 million additional jobs could be created during their construction, operation and maintenance phases. For example, the North-South Corridor—comprising 16 projects across eight countries—is expected to generate 4.5 million jobs over its full implementation period, alongside approximately 130 000 additional jobs in related sectors such as agri-food, mining and trade. These projections highlight the substantial employment potential of large-scale infrastructure investments.

## Extreme poverty

Improved infrastructure development in Africa, as modelled in the scenario, also has the potential to lift millions of people out of extreme poverty. Chart 24 depicts extreme poverty in the Large Infrastructure and Leapfrogging scenario versus the Current Path from 2022 to 2050. Using the US\$2.15 per day poverty line, the number of people living in extreme poverty will decline to 299 million by 2050, approximately 63 million fewer than under the Current Path forecast for the same year. This corresponds to a poverty rate of 11.5% in 2050, which is 2.4 percentage points lower than the projected rate on the Current Path.

Chart 24: Extreme poverty in Large Infrastructure and Leapfrogging scenario vs Current Path, 2022-2050



Source: IFs 8.5.0 initialising from UNPD Population Prospects estimates, WDI population data and PovcalNet World Bank data

The Large Infrastructure and Leapfrogging scenario will lead to poverty reduction across all African countries. However, the scale of impact will vary significantly, depending on initial poverty levels, population size and economic structure. Countries with the largest concentrations of people living in extreme poverty will experience the greatest absolute reductions. In particular, the DR Congo will see about 13 million fewer people living below the US\$2.15 poverty line in 2050 compared with the Current Path, followed closely by Nigeria with 12 million. Other notable reductions are projected in Sudan (3.9 million), Mozambique (3.8 million) and Tanzania (3.6 million). These large absolute gains reflect both the size of their poor populations and the strong growth and employment effects generated by improved infrastructure, which raise incomes and expand economic opportunities.

The impact also differs across income groups. Low-income countries will record the largest aggregate reduction, with 38.6 million fewer people living in extreme poverty compared to the Current Path, followed by lower-middle-income countries with 23 million fewer poor people. Upper-middle-income countries will see a much smaller reduction, around one million, at the US\$2.15 threshold. This pattern is expected, as extreme poverty is already less prevalent in higher-income economies. In contrast, low-income countries start from higher poverty rates. They are therefore more responsive to growth, trade expansion and job creation triggered by infrastructure development, resulting in larger poverty declines both in absolute and relative terms.

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## About the authors

Dr Kouassi Yeboua previously worked as a Senior Researcher at AFI, where he led significant ISS studies on the long-term development prospects of the Democratic Republic of Congo, the Horn of Africa, Nigeria, Malawi, and Mozambique. His research focuses on development economics, macroeconomics, gender, and economic modeling. He holds a PhD in Economics.

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